

# COMPUTERWORLD

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## The Crisis

### U.S. Losing Out On Gas Royalties

By Connie Winkler  
CW Staff

WASHINGTON, D.C. — Motorists sitting in gas lines don't need any more to fume about, but the General Accounting Office (GAO) says the government isn't even getting its rightful share of those high gas prices.

Part of the problem is poor computer utilization in calculating, monitoring and collecting royalties on oil and natural gas taken from government and Indian-owned lands.

GAO called the situation a "serious breakdown" in financial management of the U.S. Geological Survey's collection of oil royalties, which has resulted in the loss of millions of dollars. Conducted last year, the study of fiscal 1977 turned up \$359 million in back payments and resulted in an additional collection of \$2.6 million after GAO identified errors in the collection system.

The filing of 12,500 monthly reports  
(Continued on Page 6)

### Hotel Chain Has Daily Fuel Data

By Tim Scannell  
CW Staff

MEMPHIS, Tenn. — Threatened by dwindling fuel supplies and odd-even, half-tank-hysteria, at least one major hotel chain has started using its computerized reservation system to track nationwide gasoline availability for its guests.

Using information supplied by nearly 1,450 of its more than 1,500 hotels across the country, the Holiday Inn chain is providing daily fuel data to prospective travelers from the chain's headquarters here via a toll-free telephone number — (800) 238-8000. The hotel group also produces a weekly National Traveler's Gasoline Advisory, generated from its daily updates, which is mailed to a number of state tourism directors and newspapers.

Focusing on gas availability in the major cities and on interstate highways, the advisories tell how many fill-

(Continued on Page 2)

### Quarter Earnings Falling Short

## IBM Hikes Rental, Lease Prices 5%

By a CW Staff Writer  
ARMONK, N.Y. — IBM last week boosted rental and lease prices for most of its systems in a move to improve its earnings outlook.

In addition to an across-the-board 5% rental and lease hike on all except its newest equipment, the firm also raised maintenance prices 5% to 15% for most of the products offered by the Data Processing Division and the General Systems Division.

The increases will not apply to the System/38, the 8100 or the 4300 series of processors.

A spokesman said the increases — which do not affect purchase prices — reflect the increased costs to the company of doing business. However, they also may serve to enhance IBM's earnings, which are expected to be disappointing in the second quarter.

In the past few weeks, several top IBM executives have been warning that earnings may be lower than expected in the second quarter, and some Wall Street analysts have lowered their projections on IBM's second-quarter net. Several indicated IBM might be as

much as \$50 million off its plan in April.

The expected flattening of second-quarter earnings was caused by lower than expected purchases of IBM computers as more and more users have opted for rental and lease programs, the analysts said.

Users are apparently reluctant to purchase machines at the present time because of uncertainties over future

IBM product and pricing plans. For example, several industry observers have predicted price cuts for the entire Series 30 line, and users are probably waiting for those reductions before purchasing those processors.

In addition, the widely-rumored H series of computers from IBM promises to impact the high end of the 370 and Series 30 mainframe lines. Much  
(Continued on Page 6)

## First 4331 DOS/VSE User Has High Praise — But . . .

By Don Leavitt  
CW Staff

CANTON, Mass. — For more than two months now, an IBM 4331 with the DOS/VSE operating system has been humming along with few if any problems.

However, the pioneering user of the system warned at a meeting here last week that IBM still has some work to do on implementing true distributed

processing and confirmed reports that at least some independent software will not run with the operating system without alteration.

In mid-April, two and a half months after IBM announced the 4331 and the DOS/VSE operating system, Associated Catholic Hospitals became the first organization outside IBM to install the hardware/software combination.

Last Wednesday, less than a week before the software is released for general availability, programming manager Frank Okerholm had high praise for just about everything that had been delivered.

But he also admitted he was concerned about what his Boston-based data center may face as it tries to shift to a distributed data processing (DDP) system configured around its IBM 3031 and the more than half-dozen 4331s still to be installed in the hospitals throughout Massachusetts served by Associated Catholic Hospitals.

Speaking of the way the 1M-byte  
(Continued on Page 8)

## Calcomp vs. IBM Verdict Upheld by Appeals Court

By Jeffery Beeler

CW West Coast Bureau

SAN FRANCISCO — Vendors that have yet to begin the trial phase of their antitrust suits against IBM got some ominous news recently when an appellate court upheld a directed verdict against another IBM courtroom opponent, California Computer Products, Inc.

The Ninth Circuit Court of Appeals rejected Calcomp's motion to overturn the unfavorable directed verdict, which a federal district court delivered about two years ago in the Calcomp vs. IBM antitrust suit.

Calcomp is still studying the ruling by the three-judge panel and has yet to decide whether to appeal it, a spokesman said.

Using arguments from earlier antitrust cases to support its opinions, the appellate court said a dominant firm must "unnecessarily exclude competition" and be "unreasonably restrictive of competition" to become liable under U.S. antitrust laws.

By those legal standards, the court said in its opinion, IBM does not qualify as an antitrust violator. "There was no substantial evidence that any of IBM's alleged acts both constituted unreasonable conduct for a monopolist and produced causal antitrust injury to Calcomp," the court said.

In its case, the plaintiff accused IBM

of engaging in predatory pricing in response to competition, of redesigning its hardware in an attempt to restrain competition and of raising its CPU prices to offset losses resulting from its reduced peripheral prices.

The appellate court, however, rejected those claims. It ruled Calcomp produced no evidence to support its  
(Continued on Page 8)

## The Maverick Mainframer

By Marcia Blumenthal  
CW Staff

MINNEAPOLIS — Compared with its mainframe competitors, Control Data Corp. appears to be a maverick.

While other mainframers derive their revenues primarily from the sale of general-purpose systems to end users, CDC earns about two-thirds of its revenues from the sale of peripherals and services.

Yet product line differences do not explain CDC's distinctive quality. The kernel of the company's uniqueness is its philosophical underpinnings. That philosophy is simply stated: "The improvement

of productivity and the quality of life for individuals and organizations through the application of computing technology, financial resources and professional services." And the major backer of the CDC philosophy is Chairman William C. Norris, who founded CDC in 1957 and for the past 22 years has shaped the firm's emphasis on social progress.

In particular, CDC has attempted to alleviate unemployment by establishing plants and vocational training programs in economically depressed areas and by providing educational opportunities for the culturally deprived, most notably  
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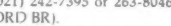
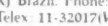
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## Could Slow Innovation DP Scientists Fleeing Universities

By Brad Schultz

CW Staff

WASHINGTON, D.C. — U.S.

progress in computer technology may slow down because many of the nation's best computer scientists are leaving universities for jobs in industry.

The migration will accelerate, making progress in computing more difficult, as long as funds for experimental projects in academic computer science remain scarce, according to a recent National Science Foundation (NSF) study. More than 600 faculty positions in computer science departments are now reportedly vacant.

While much important research occurs in private firms, "universities have provided the most broadly based environment for research and advanced development in experimental computer science," NSF's Ad Hoc Committee on Experimental Computer Facilities observed. Academics have a certain degree of "leverage," usual in industry, that allows them to explore the limits of what is possible in computing.

In fact, the computer industry cannot thrive unless lab-oriented computer scientists continue to produce high-quality research in universities. Such research is often expensive because it requires the latest in computer facilities, the committee pointed out.

In addition to creating market areas for the computer industry and pointing users in the direction of new applications, academics also train the highly skilled professionals society demands, it noted.

"An immediate investment in capital equipment" is needed to improve experimental computer science in universities, the committee advised. And government and industry should pay for it.

Government can stimulate the flow of "money, equipment, ideas, joint research and joint appointments" between universities and industry by providing tax incentives, according to the report. Government should also reevaluate "antitrust actions for their effect on university education and research," said the committee of four

computer science professors and four executives from IBM, Bell Laboratories, Inc., Xerox Corp. and Digital Equipment Corp.

### Researcher Flight Accelerating

"Experimental facilities at universities, remaining from time-sharing and networking experiments, are largely obsolete, and no adequate plan for their replacement is presently available," the committee charged.

"If the situation persists, there will be an accelerating flight of good research people from universities to [industry]." At a time when "universities should be increasing the size and quality of research and training programs in computer science," the committee pointed out that these programs are declining in strength.

Meanwhile, certain industrial laboratories "have achieved eminence by providing adequate equipment support for their computer researchers," the committee noted. These include IBM's Yorktown, N.Y. operation; Bell Laboratories; Xerox's Palo Alto, Calif., research center; and various units of General Motors Corp.

According to NSF, industry allocates \$40,000 to \$60,000 in equipment for each research professional for "leading" research in experimental computer science. In contrast, the "vast

bulk" of computer experimentation at universities gets "well below" \$10,000 in equipment per researcher.

### University Breakthroughs

While much of computer science is not concerned with developing products and capabilities for the DP user, university computer scientists have given the world many of its most important DP applications, the committee noted. Such breakthroughs include time-sharing, data networking, virtual memory, file protection, dynamic storage management, system editors and interpreters.

University research groups are presently developing much of the technology users expect to have in the 1980s. Right now, these groups are probably shaping the distributed data base technology that will be applied commercially in the next decade, the committee continued.

Another application, which may have "a tremendous . . . impact on the economy," is office automation. This "involves a marriage of hardware and software technologies from [university-originated] areas of graphics, document preparation, data base manipulation, time-sharing, communications technology and networking," the committee explained.

## Hotel Chain Has Gas Data

(Continued from Page 1)

ing stations are open during the week and on weekends, whether they have specific closing times, how much gasoline is available at these stations and if they have quantity or dollar limits.

Each Holiday Inn collects this gasoline data from service stations within a five-mile radius and relays the information to Memphis headquarters through a dedicated CRT terminal. The chain has about 2,000 U.S.-based terminals in its Holidex reservation system that are linked on-line to a central IBM 360/50 mainframe here.

Once the fuel figures are entered into the mainframe and correlated with others, a reservationist could theoreti-

cally plot a motorist's gas-dependent travels to a specific Holiday Inn, according to Marilyn Duncan, the coordinator of press communications.

### Needed to be Done

"Travelers need to know gasoline availability along the interstate if they are planning to travel by automobile," she added, pointing out that getting there may be half the fun, but getting back could be a problem.

"I don't think [the service] was precipitated by any kind of reservations problem or anything," she commented. "It just needed to be done because of the situation with the gasoline right now."

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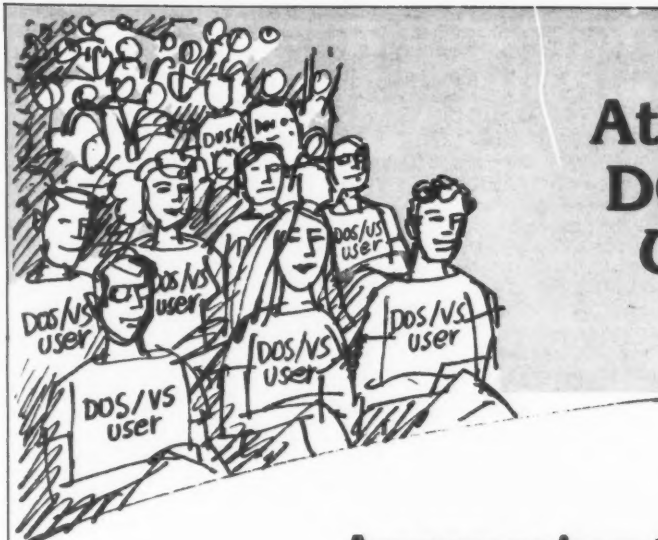
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# Attention DOS/VS Users!



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# Philosophical Underpinnings Distinguish . . .

(Continued from Page 1)

using its Plato computer-based education system.

Norris' penchant for investing in projects to cure society's ills has been costly. Norris believes, however, that his strategy will provide a long-term payback rather than short-term profit gains.

But not all analysts agree with that humanistic approach. They note that the bottom line of CDC's computer business has been erratic.

When Norris retires, CDC may become much more profitable, one analyst suggested, pointing to CDC's money-losers — Plato and Ticketron, a ticket ordering service.

The financial record has indeed been spotty. In 1974, CDC lost \$35 million on its computer business.

CDC's earnings have begun to rally in the past four years, rising from \$12 million in 1975 to \$41 million last year. (Between 1977 and 1978 alone, earnings increased 105%.) Over the past four years, computer-related revenues have increased from \$1.2 billion to \$1.8 billion.

Aside from its computer business, CDC operates the Commercial Credit Co., a wholly owned financial subsidiary, which in fiscal 1978 accounted for only 32% of revenues but a whopping 54% of earnings.

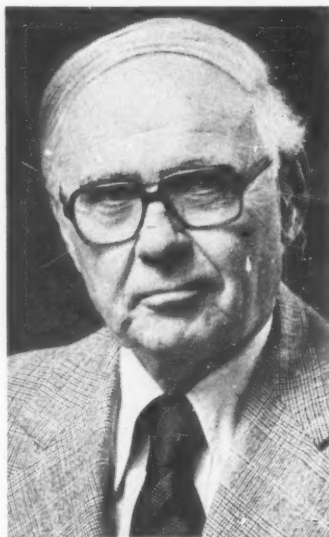
## Antitakeover Measure

Of all the mainframers, CDC has the lowest ratio of net income to revenues — 3.3% last year — and the lowest return on stockholder equity — 8.4% in 1978. In fact, CDC paid its first common stock dividend in 1977, 20 years after its founding.

By comparison, other mainframers' income-to-sales ratios ranged between 4.7% and 10.3% last year and returns on stockholder equity ranged between 12.2% and 16%.

To discourage takeovers by corporations seeking to woo shareholders with promises of increased returns, Norris was instrumental in pushing through

an antitakeover amendment to the company's bylaws. This amendment, approved at the 1978 annual meeting, requires the board of directors to assess the community impact of specific acquisition proposals.



William C. Norris

And to assure no rumblings come from the ranks, Norris, who is considered an iconoclast and pioneer, has seen to it that his current top management is in agreement with his corporate ideals, one analyst noted.

## Three Businesses in One

On the business side, CDC views its computer operations as three distinct businesses:

- Computer systems, concentrating on high-end processors for scientific and engineering markets.
- Peripherals, selling IBM-compatible and minicomputer peripherals to both end-user and OEM segments.
- Services, focusing on traditional processing services and a variety of

specialized applications.

In the system portion of its computer business, CDC concentrates on high-end processors primarily for on-line scientific and engineering applications.

"We could care less about classical DP," Robert W. Duncan, executive vice-president of DP systems, declared.

Market researcher International Data Corp. (IDC) estimated that CDC holds 3.2% of the dollar value of general-purpose CPUs installed worldwide, with 44% of its installations outside the U.S.

Compared with its four main non-IBM competitors — Univac, Burroughs Corp., NCR Corp. and Honeywell, Inc. — CDC had the smallest number of general-purpose processors installed worldwide at the end of 1978. However, an average CDC system is valued at \$2.6 million, significantly higher than systems from IBM or the four other mainframers.

Xerox's equipment, with an average system value of \$912,000, is the second highest, IDC noted illustrating CDC's concentration in the high-end market.

CDC stopped breaking out its revenues by product line last year, but in 1977 systems represented only about \$500 million of CDC's total computer revenues of \$1.5 billion. Peripheral sales that year totaled \$720 million and services, \$300 million.

## Chipping Away

Duncan claimed that the systems sector of the business is growing at 18% this year, with orders up 22%.

Like other mainframers, CDC is courting new accounts. Nearly 40% of orders for Cyber 170s came from new accounts, up from about 20% last year, Duncan said.

New account business for these larger systems is generally achieved by selling a second system with a specific application into a site that has another non-CDC mainframe.

While the profitability of CDC's

mainframe line is a matter of conjecture among analysts, Duncan said CDC is "increasing income and revenue while reducing the assets needed to do that by one-third. You don't do this in a sweeping way, but chip away at a lot of areas."

For example, Duncan pointed to 50 different programs on the company's balance sheet. "We are just cleaning up receivables and have changed the terms of some contracts," he said.

While Duncan admitted a recession could hurt CDC, the company is concentrating on penetrating industries that are relatively recession-proof, such as petroleum and utilities. Other major market segments CDC is pursuing include government, education and manufacturing.

Today CDC spends two times the amount for software research and development as it does for hardware, Duncan noted, adding that the company is also spending a couple of million dollars to improve software productivity.

Realizing that software is a great escalator of costs, CDC has embarked on usage pricing of software. Under this system, users pay for only the number of times they use an application.

This way, users will buy more application software. Software now represents 20% of some users' total monthly charges, Duncan said.

## Users Satisfied, But . . .

Users on the whole appear satisfied with CDC. VIM, CDC's large system users group, has an advisory committee to assist CDC with long-range product planning. When resources are limited, CDC asks VIM members to help set priorities for CDC projects, Anthony Brittain, vice-president of VIM, noted.

When particular short-range problems arise, VIM members form ad hoc committees to deal with them.

Conversion is one area that CDC appears to have "let fall through the crack" for both large and small system users. One member of Focus, CDC's small system users group, complained that CDC provided poor conversion aids to 3000 series users migrating to Cyber 170s.

When the firm terminated certain software support for 3000 users about three years ago, some 3000 users migrated to other vendors. "CDC didn't appreciate the fact that users could go to other vendors," one user noted.

## Peripheral Products

CDC's peripherals business is the largest revenue producer in the computer sector of its business. Growing at about 33% annually, peripherals revenues are expected to exceed \$1 billion and account for nearly half of computer revenues by 1980.

Yet peripherals have not always been the hope of CDC. "In 1975, 25% of our peripherals customers went down the tubes," Thomas G. Kamp, president of peripheral products, recalled. At that time, CDC was just starting to make minicomputer peripherals and was overly dependent on a few large mainframe companies — Singer, Xerox Corp. and Siemens. CDC lost those accounts.

In 1976, CDC's peripherals divisions were still shipping out "onesies and twosies for evaluation by mini

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# ... CDC From Its Mainframe Competitors

makers," Kamp explained. Today, however, the firm has 850 OEM customers, compared with 50 in 1976. Nearly 60% of CDC's peripherals business is with the OEM sector, 25% with non-IBM users and 15% with users of IBM-compatible equipment, Kamp said.

Included in the IBM portion of the business is the Omega 480 series, CDC's plug-compatible mainframes, which CDC purchases from IPL Systems, Inc. CDC said it had installed 50 of these systems by the end of 1978.

*This is the last in a series of profiles of IBM competitors in the general-purpose mainframe area.*

While it may seem odd to include mainframes within the peripherals sector of the business, CDC views the Omega line as a way of increasing sales of IBM-compatible peripherals. At any rate, the company does not have much of an investment in the plug-compatible mainframe business and is not counting on it as a huge revenue producer.

## Niche: Disk Drives

CDC's niche is storage module disk drives featuring 40M to 300M bytes per drive. IBM abandoned that technology in favor of Winchester-type drives in 1973, leaving CDC an opening in the market.

Roughly 50% to 67% of CDC's peripherals business is in disks, but Kamp expects its printer business to increase significantly over the next couple of years.

Kamp credited a major portion of the company's success in the peripherals market to participation in joint ventures for the production and development of peripherals.

Magnetic Peripherals, Inc. (MPI) is CDC's joint venture with Honeywell for the development and manufacture of disk products. CDC owns 70% of this venture.

MPI, aside from giving the partners the opportunity to purchase disks at cost, offers them the ability to technologically update products consistently. "Very few companies have the financial strength to keep up with technological development," Kamp said.

CDC recently acquired the controlling share of Computer Peripherals, Inc., a joint venture with NCR and International Computers Ltd., for the development of printers and tape drives.

## Data Services Co.

CDC's Data Services Co. last year yielded about \$350 million in revenues. Growing at about 21% annually, CDC is the largest company within the services industry. It acquired a major portion of its business, the Service Bureau Co., in 1973 from IBM as part of the settlement of an antitrust suit CDC had brought against IBM.

Total 1978 service revenues, including maintenance and Plato education services, totaled \$697 million, CDC reported.

The Service Bureau Co. operates 30 data centers which perform standard DP services on a batch basis for companies in the \$1 million to \$50 million

yearly revenue range.

Overall, the Data Services Co. has about 12,000 time-sharing customers. The services offered to these users are designed for companies that have their own computers, but require specialized reports and applications not available in their own DP shops.

CDC's service business primarily targets financial markets.

In deciding on new service opportunities, CDC "looks at forecasts by industry experts for markets that have the most prospects for growth and which fit the company's current market penetration," Robert W. Kleinert,

president of the Service Bureau Co., noted.

The Data Services Co. also operates several other ventures such as Cybernet, a remote computing network, Ticketron, the ticket ordering service, and Arbitron, a broadcast audience measurement service.

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## Analysts Blame Short Earnings For IBM Hikes

(Continued from Page 1)

of the purchase content of IBM machines has traditionally come from users of these high-end machines, who are now holding back until they can see the H series before committing themselves to purchases.

### Typical Changes

Giving several examples of price changes, which he cited as typical, the spokesman said monthly rental on a 12M-byte 3033 will go from \$95,650 to \$99,143; a four-year lease on the same system will now cost \$90,180/mo, up from \$87,010.

A 4M-byte 3031 that formerly rented for \$29,530/mo will now set users back \$30,698/mo. The same system will now lease for \$27,920/mo on the Term Lease Plan, up from \$26,860.

The price increases affect other areas, too. For example, a 3340 disk drive that rented for \$1,100 now goes for \$1,154/mo and the monthly lease price for that disk has risen from \$936/mo to \$982 on a two-year Extended Term Plan. Monthly maintenance on the 3340 will rise from \$92/mo to \$96.50.

Price increases for hourly maintenance services and new systems engineering contracts will become effective immediately, IBM said, although other changes will not become effective until Oct. 1.

Also included in the price increases are systems engineering services,

MAYNARD, Mass. — Digital Equipment Corp. has announced 10% to 20% price reductions on the Decsystem-20 family and reductions on the cost of its MOS memory systems, effective today.

The Decsystem-2020, formerly priced from \$161,800 to \$263,000, is now available for \$129,800 to \$228,000, a price decrease ranging from 20% to 13%.

The cost of the 2040 has been reduced 10% from \$359,600 to \$324,600, while the 2060 was cut from \$485,100 to \$399,100, an 18% reduction.

DEC also announced that, starting immediately, entry-level packaged

systems in the VAX-11/780, PDP-11/70 and PDP-11/34A families will include increased memory capacity. For example, the VAX-11/780 with 256K bytes of MOS memory, previously priced at \$128,600, will sell with 512K bytes of memory for \$134,600.

Posting major price reductions on MOS memory, DEC said the cost of 2M bytes of memory for the VAX-11/780 has dropped from \$70,000 to \$29,800, for example, a decrease of 57%. On the PDP-11/70, 1M byte of memory now sells for \$32,000 rather than \$80,000.

The cost of a PDP-11/70 and 1M

byte of memory has been cut 53%, from \$93,000 to \$43,700.

DEC's PDP-11/34A memory price was cut from \$8,500 to \$6,000 for 256K bytes and from \$4,500 to \$4,000 for 128K bytes.

Along with the price reductions and price/performance improvements, DEC increased prices on a number of its older products to "reflect inflation and the increased costs of manufacturing these products at low volume."

In addition, software support costs have been adjusted upward "to more accurately reflect their true costs," the vendor said.

## DEC Cuts System, Memory Prices

## U.S. Losing Fuel Royalties

(Continued from Page 1)

and the computation of royalties has created a "paperwork blizzard," the GAO said. Late last year the Department of the Interior, of which the Geological Survey is a part, organized a task force in response to the study.

In fiscal 1977, 16% of domestically produced oil and 24% of natural gas came from federal and Indian-owned lands, including offshore drilling sites. The value of this oil and natural gas was \$8.2 billion, with the government and Indian royalty shares totaling \$1.2 billion.

An understatement in light of today's high gasoline prices, the GAO said the trend toward increasing royalties will continue in the future. Actually collecting these royalties, however, has been a "troublesome" problem which was identified in a GAO study as far back as 1972. The latest study is a report to the U.S. Congress, "Oil and Gas Royalty Collections — Serious Financial Management Problems Need Congressional Attention."

"Geological Survey lease accounts contain many errors which could either be eliminated, reduced or identified through the use of computer edits and other computer utilization techniques," the study said.

### Inaccurate Records

One basic stumbling block is that the Geological Survey records, based on information supplied by the oil and gas companies, are not accurate. For example, if the recorded amounts for royalties due the government and royalties paid do not agree, the Geological Survey computer shows a balance rather than clearing the account.

"On July 31, 1978, the Geological Survey maintained 22,735 lease accounts. Of these accounts, only 6,569 did not have a balance. Of these accounts with a balance, 9,497 indicated that the amount paid was greater than the royalties due the government," the agency found.

To alleviate this, the GAO recommended the Geological Survey encourage companies to send royalty reports on magnetic tape. Only nine of the major 21 companies did so in 1977.

Direct magnetic tape input is a sore subject with GAO because the agency made the same recommendation in 1975. Only three more companies moved to magnetic tape reporting in the subsequent two and a half years.

The GAO also recommended simple computer edits to check for companies

which have not filed reports and to uncover lists of oil/gas leases for which no payment was made or for which the payment was wrong. A simple matching job — comparing those making payments against those who should be paying, so that payments go to the right account — was another recommendation.

The Geological Survey was guilty of many bookkeeping errors, including entering payments on the wrong account, the GAO reported.

The GAO also recommended stricter computer coding requirements so changes of data could be traced.

It also suggested that the Geological Survey implement a computer-based review process including audits, financial reconciliations and lease account analyses — a cursory examination of the automatic data processing coding, value, volumes and well-count reported by the oil/gas lessee or operator who pays the royalties.

"Our review... led us to believe that additional royalties can be collected," the GAO said. "Audits conducted by the private oil and gas company show that royalties due are normally understated by 7% to 10%."

### \$12 Million Lost

And, as if the computer failings weren't enough, GAO found the reporting of royalties wasn't even consistent among the various offices. The Interior Department itself found \$12 million to \$13 million was lost because the Metairie, La., office was not properly determining manufacturing allowances.

The problem is that the chief accountant, the only Geological Survey official whose duties and responsibilities are solely concerned with royalty collection, serves only as adviser.

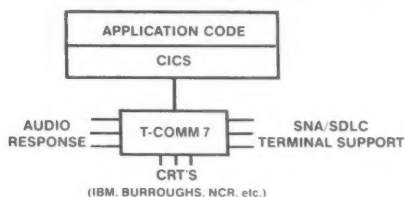
The GAO also made substantive recommendations to improve the collection of royalties, suggesting:

- That company reporting be staggered over a year (instead of monthly) so that only companies with more than \$50,000 in monthly royalties be required to report monthly.

- That the Geological Survey and the Department of Energy develop cross-service auditing arrangements which would conserve staff, increase efficiency and decrease the burden on the oil and gas industry.

- That the royalty reporting system be standardized, with one office responsible for establishing agencywide accounting policies.

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# New York Judge Tells IBM to Turn Over Papers

By Connie Winkler

CW Staff

NEW YORK — In a ruling IBM called "catastrophic," Judge David N. Edelstein ordered the firm's lawyers to hand over the documents requested by the Department of Justice in connection with its cross-examination of IBM Chairman Frank T. Cary in the U.S. vs. IBM antitrust case here.

The order appears to settle the latest squabble over whether IBM has to provide what it estimated is five billion more documents at a cost of \$1 billion. But, in fact, it has actually complicated the situation.

The order will delay the trial for months or years, IBM chief counsel Thomas D. Barr told Edelstein. Barr has asked for time to study the opinion, which he said may require a restructuring of IBM's defense.

Barr later said IBM is taking a "stand back and wait" position. "There's a massive spectrum of things we might do," he said. "We haven't made up our minds. We won't for some time."

The head of the government's trial team, Robert J. Staal, said the Justice Department's Antitrust Division is

still willing to narrow down and negotiate the document request. Edelstein, in the last page of the order, urged that the document production be given "the full and good faith cooperation of counsel."

## 'Impossible and Expensive'

To produce all the documents the government requested in its Feb. 7 subpoena of Cary would require almost 62,000 man-years and the scouting of 2,000 locations in 120 countries, IBM complained. In March it vigorously protested the document request in a motion to quash the subpoena, charging the request was part of the Antitrust Division's continuing effort to force a stalemate in the trial with "impossible and vastly expensive dis-

covery burdens."

In a closed chambers session the day the order was filed, Edelstein urged that the trial — which has been adjourned three months while the judge considered the Cary and 16 other motions — resumed last week. Barr said he needed time to consider the opinion, and Edelstein gave him several days.

"While IBM and Cary have ingeniously supplied figures estimating the number of documents and consumption of time involved in production, they do not demonstrate that compliance would disrupt the day-to-day operation of IBM," Edelstein said.

## Two Favorable Rulings

For IBM, Edelstein's ruling was a sour note in a week which included

two favorable rulings.

In California, the Ninth Circuit Court of Appeals upheld a 1977 directed verdict for IBM in the California Computer Products, Inc. vs. IBM antitrust case.

And, in New York City, the Second Circuit Court of Appeals reversed an \$87 million civil antitrust verdict for Berkey Photo, Inc. in its battle with Eastman Kodak Co. Berkey charged Kodak monopolized a large part of the amateur photography business, particularly with Kodak's 110 Pocket Instamatic Camera, introduced in 1972.

IBM, which finds the Berkey decision favorable, has been watching this case because the ruling was made by the same appellate court which would review U.S. vs. IBM.

## West Coast Trial Wrapping Up

By Jeffery Beeler

CW West Coast Bureau

SAN FRANCISCO — A casual observer would never have guessed that a multimillion-dollar lawsuit hung in the balance as final arguments began last week in the Transamerica Computer Co. vs. IBM antitrust trial.

No dramatic confrontations, stunning revelations or angry exchanges disturbed the decorum of Judge Robert H. Schnacke's federal district courtroom here.

But behind the facade of courtroom dignity and etiquette, a battle between two determined litigants raged.

Only when the opposing sides presented their final arguments did the magnitude and complexity of their legal struggle become fully apparent. By Wednesday, two days after it began, Transamerica had yet to finish rehearsing its case for the jury, and IBM's turn at bat was expected to take as long.

For hours on end, Transamerica's lead attorney, Richard Lucas, presented a seemingly infinite string of facts, charts and IBM documents that Perry Mason himself would have been hard-pressed to enliven.

In his final summation before the jury, Lucas reiterated his familiar refrain that IBM violated Sherman Act provisions forbidding dominant firms from "unnecessarily excluding" competition and "willfully maintaining" a monopoly.

To support his contention, the Transamerica attorney recounted, as he did at length earlier in the trial, the history of IBM's 360 series CPUs and its 2319 series disk systems. Of all IBM's anti-competitive tricks, however, the announcement of the 2319B surely ranked as one of its "crudest," said Lucas, who characterized the disk unit as little more than a "disguised price cut." IBM's response to Transamerica's charges came too late last week to be included in the current issue of Computerworld.

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# First User of 4331 DOS/VSE Offers Praise

(Continued from Page 1)

4331 went into the data center in April, Okerholm said it was a "beautiful installation." There was one "card problem" the second day the group had the system, but that was quickly solved.

"We haven't had any hardware-related service calls since then," he noted.

## 'Stable Environment' Provided

Shifting his attention to DOS/VSE, Okerholm told an overflow meeting of the New England DOS Joint Users Group here that his staff, consisting of 10 programmers and analysts, has now installed 13 IBM-supplied packages including the new operating system. The software went in smoothly and now provides a "very stable environment" for Associated Catholic Hospitals' continuing tests.

As pleased as he obviously was, however, the sandy-haired manager noted his shop is a long way from the DDP operation it really wants. Although the 4331 is acting as a remote unit to the 3031, "making one VSE machine talk to another VSE machine looks a lot more difficult than just installing VSE."

He said his data center had been interested in DDP for a long time and had considered various hardware solutions including IBM System/38s, IBM 8110s and even the Datapoint Corp. Attached Resource Computer, "which looked very promising." Now he seemed confident that IBM's Ad-

vanced Communications Function (ACF/Vtcm) "is the glue that will hold the whole thing together" in the 4331-based network.

But he also said, almost as an aside, that IBM "still has a lot of homework to do in DDP."

## Reports on Software

Earlier, Okerholm talked about individual pieces of software. He noted that CICS/VS Release 1.4 "had one little problem," but saw nothing wrong with taking two days to install it. Now that the teleprocessing system is up, Associated Catholic Hospitals has tested every function and has found "no glitches," he said.

The DL/1 installation was "very smooth," and the 2314 emulation support has been "OK."

Even under DOS/VSE itself, "the problems we expected just didn't materialize," Okerholm acknowledged, in response to a question, that the supervisor had grown from 96K bytes under DOS/VS Release 34 on the 3031 to 130K bytes under DOS/VSE on the 4331.

But, he pointed out, the user had deliberately included support for just about every function the supervisor could offer and had expanded the Page Pool area as well, since testing and not performance had been the goal until now.

Okerholm had a mixed report on the Interactive Communication & Control Facility (ICCF). Associated Catholic Hospitals was, again, the first user of

this software, and it proved "fairly difficult to get used to. The editing procedure is a challenge, and training is certainly going to be necessary before any installation can use it effectively."

But, he added, "it is an order of magnitude better than SPM."

Okerholm made a point of noting that user-written application programs were moved to the VSE environment without any problem. In most cases, "object code — actually Csects — were just relinked and used." No recompilations were necessary, according to Okerholm.

## Package Incompatibilities

Warnings voiced by consultants about incompatibilities between the IBM operating system and packages from independent software vendors appeared to be confirmed by Okerholm.

He said several packages in Associated Catholic Hospitals' collection — Epat, the tape library system from SDI, Inc.; Space Manager from Altergo Software, Inc.; and Logout from Macro 4, Inc., for example — can't be used as they are under VSE.

But he quickly added that the vendors concerned all said they would make modifications as soon as they could get hold of DOS/VSE in its generally released form and could study its coding.

Associated Catholic Hospitals became the first 4331 DOS/VSE user because it agreed to take part in what IBM called its 4300 Early Support Program (ESP). This program backed the users' use of the hardware and software in any way the installation chose — in contrast to conventional beta test operations in which the vendor generally prescribes what can be done — and provided remote but continuous technical support in return for the users' reports on what they had done and how well the system had matched expectations.

Okerholm said the support center

had given Associated Catholic Hospitals "all the support we could ever want." Even though it sometimes took a long time to respond to a problem call, the center generally came up with a workable solution to the problem faster than the conventional on-site field engineers would have been able to do in the past.

He also noted that the center had a spectrum of experts available, and Associated Catholic Hospitals programmers working with the ESP "had learned a great deal."

Learning is clearly a major factor in any installation's move to the 4331 and DOS/VSE. "There's no question systems programmers will become more valuable" in the new environment, Okerholm said. "Digging into the manuals really pays off."

Even though many of the functions are carry-overs from DOS/VS, the way they are implemented may differ, he warned.

"Different" doesn't necessarily mean more difficult. Some functions have been made much simpler. Initial Program Load, for example, is now accomplished by hitting one button, and that is "a piece of cake" compared with what operators have to do in other settings, Okerholm said.

The system has "amazing power" with "significantly faster console operations," but users have to be careful about many little things, including setting aside space for basic functions such as the dump data set, recognizing conflicts between Power spooling under DOS/VS and under DOS/VSE and learning to work with the space allocation algorithms under Vsam, he warned.

But Okerholm is still very concerned about the new era of noncentralized operations. He foresees a number of advantages to be gained from going into DDP, but said in conclusion that "we've all got to share our experiences as we move in that mode of operation."

# Calcomp vs. IBM Upheld

(Continued from Page 1)

charge that the IBM 2319A and 2319B disk units yielded "substantially" lower profits than their predecessors, which cost 30% more.

In the same breath, the court disputed Calcomp's claim that IBM introduced its 2319A and 2319B solely in an effort to maintain its share of the disk subsystems market. In the court's view, IBM introduced the 2319A to cut the overall price of its 370/145 mainframe and to regain market share from peripherals manufacturers that "were flourishing under IBM's high price umbrella."

The court also dismissed Calcomp's complaints about IBM's fixed-term plan (FTP), which the plaintiff described as "the single most important act in [its] litigation and the principal basis for its damage claim." No evidence submitted by Calcomp disproved IBM's claims that FTP price cuts were intended to produce a 30% profit, the court said.

"Lease revenues would be reduced through 1972, but through 1975 FTP was expected to generate \$165 million more profit than would have been the case without FTP lease options," the

court explained.

In rejecting Calcomp's characterization of IBM's pricing as "predatory," the court reaffirmed the right of a dominant firm to cut its prices in response to competition. "The question facing us in this case is whether IBM ... had the right to respond to the lower prices of its competitors with reduced, but still substantially profitable, prices on its own products," the court argued. "We conclude that it did."

Calcomp's interpretation of IBM's pricing policies implies that a dominant firm can engage in no competitive activity that would harm its competitors, and such an argument is clearly contrary to U.S. antitrust laws, the court said.

Elsewhere in its decision, the court reaffirmed IBM's right to use its business acumen, including shrewd pricing decisions, to maintain a dominant market share.

"Where the opportunity exists to increase or protect market share profitably by offering equivalent or superior performance at a lower price, even a virtual monopolist may do so," the court concluded.

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# An Election Year Ploy?

## Feds Developing Models to Revamp Pay Scales

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — Having successfully shepherded a civil service reform act through Congress earlier in his Administration, President Jimmy Carter has now proposed an ambitious scheme to revamp the federal pay system and in the process, he says, save the American taxpayer as much as \$3 billion.

It is a complicated scheme, and the Office of Personnel Management (OPM) and the Bureau of Labor Statistics (BLS) are now putting their collective heads together to develop some computer models to facilitate its implementation.

The proposal Carter sent to Capitol Hill June 7 is based on something called "total compensation comparability." The idea is to start figuring the federal benefits package into the overall pay formula. Presently, benefits are not considered when setting pay schedules.

A rough estimate from OPM (formerly the Civil Service Commission) is that federal benefits are running 2% to 5% higher in value than those found in the private sector.

A second major component of the proposal is to start pegging federal salaries at prevailing local levels. Current pay scales are set nationally, which leads to federal salaries that, compared with private-sector jobs, are high in some geographical areas and low in others.

### National Survey Planned

Balancing public and private benefit values and matching salary levels for numerous job categories in some 135 statistical areas is going to require a fair amount of arithmetic. This is where the computer modeling comes in. According to Raymond C. Weissenborn, director of OPM's Compensation Division, "the details are still being worked out," but the basic methodology is well in hand.

The first step, Weissenborn said, will be to conduct a national survey of benefits in the private sector using information supplied by employers under the Employees Retirement Income Security Act and additional information obtained through a national survey by BLS of some 3,000 businesses across the country. The salient data will cover such benefits as retirement plans, life and health insurance, holidays and sick leave.

### Modeling Enters Picture

"We would be determining the cost of a particular employer's benefits just as if we were going to apply those benefits to the federal work force. Now that's where we get into modeling, because the model includes all the information about the work force: the ages, the sexes, the distribution of it geographically — all those kinds of things which are required before you can determine what it would cost you to apply a particular [benefit] program to your work force," Weissenborn explained.

By costing out private vs. federal benefits against the government work force, BLS will be able to compare the two programs. This will be done on a national basis instead of locally, Weiss-

born said, because benefits and their costs vary greatly from area to area.

The second step will be to add in the results of the regular BLS national salary survey, which produces "an index relationship of the level of pay in the local area against the national job averages." For instance, he noted, it has been determined that clerical workers in Detroit make about 18% more than the national average.

If the federal benefit differential is found to be, say, 5% above the private sector, then government clerical employees in Detroit should be receiving salaries that are only 13% above the national average.

The benefits survey will be updated

regularly, although the results should not change very often since benefit packages tend to be fairly constant, according to Weissenborn. To perform the yearly federal pay adjustment, "we would just put the national general [pay] schedule into the computer, which would be programmed for the index relationship for every area and ... for the difference in the benefit values which were determined through that year's survey, and it would crank out all the different areas' schedules."

### Beauty of Plan

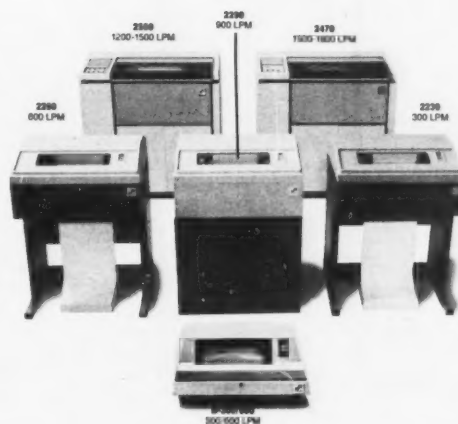
The beauty of the plan, according to the high-powered public relations blitz getting under way at the White House,

is that it will save a bundle and at the same time federal employees probably won't have to take a cut in pay. That sleight of hand is possible because federal pay raises have been held under the level of inflation for the last two years, so federal workers have lost about 6% of their expected pay boosts.

If one measures that 6% against the expected 5% benefit differential OPM expects to find, one sees the two all but cancel each other out, Weissenborn noted.

The bureaucrats do not get their 6% made up, but then they don't lose the 5% they "owe" because of their higher benefits. The Treasury becomes some \$3 billion richer.

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# DPer Starts Group to Resist Draft-Related Jobs

By Jeffrey Beeler

CW West Coast Bureau  
PALO ALTO, Calif. — Congress could face opposition from some DPers if it enacts legislation calling for a resumption of draft registration. A member of the User Services Department at Stanford University's information processing center is urging computer professionals not to participate in any DP activity associated with draft registration or military conscription.

To that end, Stanford DPer June Genis is trying to organize computing professionals into a group bent on stimulating antidraft sentiment among their computer room colleagues. Called Computer Professionals Against the Draft (CPAD), the group is being formed to "provide a network of support" for DPers opposed to a renewed draft or draft registration, Genis explained.

Many computer room personnel who might otherwise refuse to engage in draft-related DP work hesitate to do so for two reasons, Genis said:

- They believe their jobs obligate them to cooperate with the Selective Service Systems (SSS).

• They fear, probably rightly, that resistance could result in their dismissal.

Genis hopes her newly formed group will encourage latent opponents of the draft to express their views openly and act in accordance with their beliefs. "We want them to know they're not alone and that they have a right to resist," she said.

Genis also hopes her group will make antidraft DPers aware of the grievance procedures available to them if they are threatened with dismissal for refusing to aid the SSS.

## Only One Member

For the moment, the month-old CPAD consists of only one formal member, Genis herself. But the Stanford DPer claims to be less concerned at present with building membership rolls than with conducting a "propaganda campaign" and "spreading the word" of draft opposition among her fellow computer professionals.

Genis sees herself mainly as a contact point to which DPers with similar convictions can turn for support and advice. To date, she has already received letters or phone calls from "20 or 30" DPers

who sympathize with her cause, and the search for other like-minded colleagues is continuing.

Although Genis would gladly accept SSS DPers as members of her group, she doesn't regard them as prime CPAD candidates. Rather, she intends to recruit most of her sympathizers and converts from the Internal Revenue Service, Social Security Administration and various universities.

"Our goal is to build a voice that's strong enough to convince the government that there's going to be resistance" to its draft resumption plans.

If that opposition proves strong enough, the federal government might drop its effort to reinstate conscription, she speculated.

Genis, who describes herself as a "libertarian," dismisses the draft as "wrong and immoral" and equates the practice with slavery. "If you're a programmer or computer operator and you give the government name and address lists that help someone to be inducted, you're part of the slave trade," she charged.

Computer professionals have a moral obligation to resist governments when they seek to induct their citizens in

the armed forces, according to Genis. "If an organization is making a tape [for the SSS] and an operator knows what the tape is being used for, he should refuse to mount it," she said.

Many DPers, however, allegedly shirk their duties and lend their services to the draft anyway. They then reportedly justify their actions by saying, in effect, "I was only following orders."

"I don't think the Nuremberg principle in an adequate defense" for computer professionals who aid the government's efforts to reinstate conscription, Genis said.

## First Legal Action Taken in Probe Of Fronton's Destroyed Records

By Marguerite Zientara

CW Staff  
MANGONIA PARK, Fla. — Five people last week received notices to show cause why they should not be charged with destroying computer records as a result of a statewide probe into possible pari-mutuel betting irregularities throughout Florida.

While the Florida Division of Pari-Mutuel Wagering is still examining a cache of computer printouts that was buried behind the former Palm Beach Jai-Alai Fronton from last winter until May [CW, May 21], the recently issued notices — the first legal actions of the case — concern other computer records.

## Three Violations

The show cause notices pinpointed three violations, according to Dick Burroughs, Secretary of the State Department of Business Regulations, of which the Division of Pari-Mutuel Wagering is a unit.

The notices cited the destruction of computerized betting records without the permission of the Department of Business Regulations, the destruction of records of "outs" tickets (winning tickets that were never collected on whose revenue reverts to the state at year's end) and the purchase of tickets for betting by fronton employees who did not pay for them until the end of the day, Burroughs said.

Receiving notices were Richard Lawrence Brown, assistant mutuels manager; Dominic Joseph Sartorio, cashier; William Alphonso Fusco, mutuels manager; Donald Carlton Roberts, general manager; and Arthur William Sylvester Sr., owner and president of the former fronton.

## Choices Available

The five have 21 days to request a hearing to answer the charges. If they choose not to

answer the charges, "the director has the right to make the determination of guilt or innocence based on the charges and to assess a penalty," Burroughs explained.

If found guilty of the charges, the five men could have their Pari-Mutuel Wagering Occupational licenses suspended or revoked, or a fine could be imposed.

## Privacy Initiative Heats Up

WASHINGTON, D.C. — As part of its "privacy initiative," the White House has taken steps to beef up federal agency compliance with the Privacy Act of 1974.

In a June 8 directive, the Office of Management and Budget (OMB) instructed every executive branch agency to name one person to be responsible for assuring compliance with the 1974 law.

Their duties, according to OMB, will include:

- "Issuing any instructions, guidelines or standards necessary to administer the act."
- "Assuring the consistent application of regulations and policies within agencies."
- "Providing for the effective education of system managers and decision makers responsible for the maintenance of records systems."

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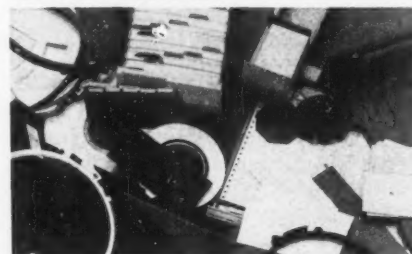
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# Privacy, Expense at Issue Welfare Fraud Prevention System Under Fire

By Ann Dooley  
CW Staff

WASHINGTON, D.C. — A federal program designed to enlist all 50 states in the effort to stop welfare fraud is being lambasted by private and government agencies on the grounds that it violates privacy and is too expensive.

The National Recipient System is an automated system developed to collect and match information on all recipients of Aid to Families With Dependent Children (AFDC).

The pilot program, which falls under the aegis of the Social Security Administration (SSA) in the Department of Health, Education and Welfare, has been criticized by the American Civil Liberties Union (ACLU) and at least one member of Congress and has received a somewhat negative report from the General Accounting Office (GAO).

Called the largest computer system to be used by the federal government to check on private citizens, it is expected to be fully operational by 1983. It will store financial data on as many as 15 million AFDC recipients, 90% of whom are women and children. The first phase is expected to begin by the end of this year.

## Matching Procedures

Under the system, each state agency will send a record of all those in its jurisdiction receiving AFDC payments to the federal government on a daily basis. The information will include the recipient's name, birth date and Social Security number and will be run

against similar data from every other state to ensure that the recipient is not receiving payment from two states.

The data will also be run against the Social Security and Veterans Administration files to ensure that disability or military pensioners are not receiving AFDC funds.

When a "hit" occurs, the name and information will be sent to the state agency for a follow-up investigation. Although the SSA expects to see large numbers of hits in the beginning, it ultimately expects the system to act as a deterrent to fraud.

After the system has been in use for a while, the names of all AFDC applicants will be sent in and the identifying information checked. In this way, the state can catch any potential fraud before it occurs and therefore avoid the problem of tracking down the recipient and checking out the case, an SSA spokesman said.

The SSA expects to save large amounts of time and money on potential cheaters who, when made aware of their personal data will be verified before the funds are distributed, will think twice about attempting a fraud.

## System's Value Challenged

The cost to the state and federal governments is expected to amount to approximately \$10 million annually, although the spokesman stated the actual cost would probably be less.

But critics contend that the savings will not justify its expense.

In a recently published report, the GAO questioned the overall long-term benefits and cost-effectiveness of the system. The report suggested that serious inadequacies in function and cost have resulted from hasty planning and recommended that the system be thoroughly assessed before implementation is begun.

Among its recommendations, the GAO report suggested that the SSA determine whether duplication occurs within states and whether it would be better to use information currently available or expand existing facilities before placing another burden on the states.

The report further recommended testing the complete process before implementation and advised the government to provide states with

projected costs, allowing them to plan on added costs.

## Privacy a Concern

Others opposing the system are concerned with the privacy of those involved.

Although the benefits of the system might outweigh the costs, according to Rep. Richardson Preyer (D-N.C.), chairman of the House Government Operations Subcommittee on Government Information and Individual Rights, "there is a serious danger that we may be selling out privacy too cheaply, and we may not even be realizing it."

John Shattuck, Washington ACLU director, contended that the National Recipient System is in violation of the Privacy Act of 1974. When information is collected for one purpose, the act specifies that

it not be used for any other purpose — yet fraud prevention programs use this kind of information all the time, he charged.

It is difficult to block this kind of matching, since there is no clear-cut victim, he added. The agencies claim that their data is very secure and that the public is best served by rooting out welfare cheats.

So far, it's been hard to answer that claim, Shattuck said.

# Cray-1 System Calculates Largest Prime Number Yet

By Jay Woodruff  
CW Staff

LIVERMORE, Calif. — A Cray Research, Inc. Cray-1 computer spent between 300 and 400 hours finding "it," using a simple program and producing one trillion bits of output every minute.

"It" is the largest known Mersenne prime number — the number 2 multiplied by itself 44,497 times, minus one — or, if written out, a number that is 13,395 digits long.

Discovered in April and verified in May by Harry Nelson and David Slowinsky while testing the Cray computer at the University of California's Lawrence Livermore Laboratory, the number took about 80 hours to verify on a Control Data Corp. Cyber 173. The Cray could do it in 20 minutes.

The discovery is roughly the square of the previous prime number found by Curt Noll, working with Laura Nickel, almost four months ago at California State University at Hayward.

"To find this number, the only method we know is just simply to try everything beyond the last one that was found," Nelson said. "It could be done on any small computer given a lot of time. The program is very small. It doesn't occupy much memory," he noted.

"My job is testing computers, especially new systems," he continued, adding that he and Slowinsky decided to use Slowinsky's Mersenne prime number program as one of the tests of the \$10 million Cray.

Nelson, who has worked at

Lawrence Livermore Laboratory for 20 years, said it is unlikely another prime number will be found soon, but that the only way to find out is to try it.

"If it were as easy to find the next one as it was to find the previous two [by Noll] before this one, it could be done in a relatively short time. On the other hand, it may be years — depending on the sequence of prime numbers — and nobody has any idea where the next one will turn up," he said.

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## Designers, Management Stymied Kiviat Criticizes State of DDP Modeling

By Jake Kirchner

CW Washington Bureau

NEW YORK — Before entering the complex world of distributed data processing (DDP), management can obtain a certain amount of "design insurance" by using modeling techniques during the planning stages.

Unfortunately, present DDP model-

ing methods and tools are really not satisfactory, according to Phillip J. Kiviat, director of client services for SEI Computer Services in Washington, D.C. The problem is actually not in the DDP models, he said, but in the nature of DDP itself.

Addressing conference attendees here recently, Kiviat remarked that DDP

modeling is similar to modeling for any kind of system. Problems arise because there are gaps in the hardware available for distributed systems, and it is generally difficult to fit DDP into an organization's current work situation.

But no matter what kind of system is being considered, "management must

invest a certain amount of money in design insurance," Kiviat said. This calls for an independent evaluation of user needs.

Too often system designers are too close to the organization and end up producing large systems that are of little value and merely represent a large, wasted expenditure of time and money, he said.

Ideally, design models for DDP should be flexible — affording investigation of numerous options. They should be economical, easy to use and timely.

The last attribute is particularly crucial, Kiviat said. The system designer must be able to get the answers he needs quickly so that he does not lose the attention of management.

The model must be understandable to management if it is to have any credibility with the final decision makers, he added.

"I don't think we have anything today that meets all those characteristics," Kiviat said. There are some good models for hardware, some types of networks and single CPU installations, but DDP technology is generally weak in the area of design support, he said.

No one will ever be able to develop a satisfactory DDP benchmark, he continued, because it would be prohibitively expensive. What is needed is the use of "conjunctive models" — taking several different types of models and applying them at the same time.

### Think, Then Code

Regardless of the types of models chosen, some design modeling is critical to DDP success. Organizations too often buy hardware, then worry about using it.

"In general, it's probably true that people start coding before they start thinking," Kiviat said. He believes that kind of unplanned and premature action is guaranteed to produce a system that won't work.

Once the system is up and running, the next requirement is for modeling techniques that support operations — to monitor the system, improve its performance and fine-tune it.

"One of the things about distributed data processing is it's supposed to bring power to the people," he said. Management needs to be able to determine whether the system is performing that function.

"There are certainly a lot of [monitoring] tools available today. Unfortunately, most of them are not network-oriented," Kiviat pointed out.

The DDP designer — and any system designer, in fact — must also ask himself how he is going to design into the system itself the monitoring capability that will allow management to easily determine such things as resource capacity and user problems, Kiviat maintained.

System vendors can do it if they want, he said. It is a matter of "corporate will" and user demand — not a technological problem, but an implementation problem.

Kiviat noted that IBM is designing more monitoring capabilities into its systems now and predicted that in the future more of this capability will be embedded in the product offerings of a number of vendors.

## Simulation Assailed for Results' Inaccuracy As Panel Notes Reluctance to Use It

By Tom Henkel

CW Staff

NEW YORK — The nation's decision makers aren't thrilled about using simulation results in making their decisions. The nation's computer people don't seem to be thrilled about simulations either.

At a recent conference seminar here on "Selling Simulation Results," panelists outnumbered attendants. And even the panel agreed simulation has a long way to go before such techniques can be used with much accuracy.

However, most of the 13-member panel agreed that there is definitely a place for simulation.

"Somehow we must find a better way to sell this important tool," Univac's Carl Hammer said. "There's much to be said about simulation; many accomplishments couldn't have been made without it." However, he conceded, "we really haven't made enough progress yet."

A less optimistic view was taken by Garry D. Brewer, professor at the Yale University School of Organization and Management. "Simulation doesn't really work very well," Brewer said. "The product is not terribly high-quality."

"The fact that we have not been successful is well known, yet we continue to behave like the only thing we have

to do is tie up some loose ends."

"Models themselves have some severe limitations," Brewer added, and one of the best ways to improve the image of simulation is to "make it rational and defensible."

The less-than-enthusiastic reaction to simulation "is not for want of exposure. The fact is that there is very little here to sell," Brewer said. Many of the nation's decision makers, in both the public and private sectors, feel simulations are too complex to be an aid to decision making.

### Cleanup Suggested

A general cleanup of the methods of model building would be a step in the right direction for improving the image of simulation, according to James Grimes, assistant systems professor at Texas Tech University. Computerized validation techniques and better documentation would help develop user confidence in simulation results, he said.

Using computer assistance to help develop models would provide "a more rigorous model," he added.

Saul I. Gass, chairman of management science and statistics at the University of Maryland's College of Business and Management said there is a possibility the government might step in to regulate model makers if they

don't improve their techniques. Gass urged better validation of data, structured documentation and better relations between the user and developer.

A new documentation system by developers that demonstrates why they believe in the model, how it should be used and what its limitations are should be instituted, Gass said.

Hammer agreed, adding that the developers should be subject to an "unfriendly test" — not be allowed to analyze their own data. Hammer said he favors analysis by an impartial reviewer.

"We're at the level of the World War I biplane. We're a long way from the Wright brothers, but far from where we want to be," said Fred Kile, research consultant for the Aid Association for Lutherans.

"Modeling tends to take a long term look at a society of short-term pay-offs," he added.

Many decision makers will accept simulation data if it supports their conclusions. Otherwise, the information is disregarded, according to Alexander L. Pugh of Pugh-Roberts Associates.

"The decision maker lives in the context of his peers," Pugh said. It is almost impossible to convince a decision maker to use simulation results if they don't support his original convictions.

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# Improper Use Seen Hindering Electronic Mail

By Tom Henkel  
CW Staff

COLUMBUS, Ohio — Electronic mail will play a big part in the office of the future, but developing workable systems and getting personnel to use them properly presents a stumbling block. That is the intermediate result of a multiclient-sponsored study made by Battelle Laboratories here into the future of electronic mail.

"It's a slow process," according to Richard J. Bengston, a researcher at Battelle. "In the case of electronic mail, probably nothing very important will be in use in the next five years."

"By 10 years from now, we expect there will be some pretty darn good systems operating, internally at least. Whether they will be operating among companies, I don't know."

The biggest developmental problem facing corporations today is a lack of compatibility among communications products.

"In order to take advantage of electronic mail or other electronic office stuff, you're going to have to go to a common system for the whole company, rather than letting the finance people use one thing and somebody else use something else," Bengston said in a recent interview.

"In the past there's been a functional outlook, whereby each department went its merry way."

Companies that have a hodgepodge of CPUs and communications equipment should worry, Bengston said. "Some of them are afraid to do anything about electronic mail for this very problem. Next year something else comes out that doesn't fit what we have. It's a real problem, and it's recognized by users."

"In the case of electronic mail," Bengston said, "most of the stuff is prototype or experimental anyway."

## Sophisticated Storage, Retrieval

Electronic mail includes sophisticated storage and retrieval methods along with multiple routing, according to Bengston.

"It's a series of things required to differentiate it from facsimile or the telephone. It's like data communications in the case of numerical data, only these are messages, which makes it a lot harder to do. Numbers you can work pretty handily with formulas, but you can't work so easily with messages."

If electronic mail systems are set up on an intra-company basis, their potential will be only partially tapped, he indicated. As a result, some users already are beginning to consider using electronic mail to communicate with their largest vendors, he said.

## Paying for Service

Who pays for electronic mail? Bengston said that's another sticky point.

"It's much more a question than with regular mail. With regular mail, you put a stamp on it and send it. With electronic mail, it may be that the recipient will tie up computer time and pay for a good part of the actual cost."

"The transmission costs you can pay from the sending end, but there are other costs involved, if you're sorting and retrieving and so forth."

Bengston said in a multicompany electronic mail system, the recipient could wind up being charged for the

equivalent of a wrong number.

"It's a complex problem. Within a company, it's certainly no problem. The big problem in-house is retraining and motivating people."

The controversy over analog vs. digital transmission will also be an issue in electronic mail.

"The way it is now, it's generally one or the other. Facsimile is generally analog and teleprinter is digital. You're probably going to want to switch from one to the other in a good electronic mail system because you may have diagrams that are better analog than digital."

"So the software and interfacing mechanisms, in addition to compatibility, are the major technical problems."

"It's not the development of new technology or new equipment — it's really putting a system together that's usable" that is the problem, according to Bengston.

Telephone service costs for data

transmission also constitute an important factor in electronic mail. Digital transmission will cut company costs through faster transmissions on narrower bandwidths, Bengston said.

"The cost of transmission for a given time or bandwidth combination is expected to come down quite radically as more satellites are sent up. It looks like a cheaper method of transmitting over long distances."

"However, this doesn't solve the problem of local distribution. You're still going to use the telephone lines in the city. So if you have one plant here and another across town, you're probably going through the local telephone lines," according to Bengston.

Getting the technical bugs out of an electronic mailing system will be a step in the right direction, but it won't be the final step. Bengston said getting managers to use the systems properly will also be a problem.

"In order for an electronic mail sys-

tem to work in an optimal way, each manager has to use it directly. He should have a machine in his office that allows him to send and receive without the use of a secretary."

"Easy-to-use equipment is essential. Keyboards for some people are not the answer. There's been talk about keyboards with whole phrases or words for some of the buttons."

"Or maybe you'll read handwriting. Ultimately you'll probably be able to transmit voice into visual. But that's a long way off," according to Bengston.

When an electronic mail system is fully operative, Bengston said, messages will come into the manager's office where they will be stored until he checks his terminal.

The system could also be made to signal the manager when an emergency message is being transmitted.

The problem with the system comes in getting the manager to check his mail.

## Scientist to Develop EMS Language

By Jeffrey Beeler  
CW West Coast Bureau

PALO ALTO, Calif. — A French scientist who gained modest fame for his computer-aided studies of unidentified flying objects (UFO) recently turned his attention to a more down-to-earth DP frontier.

Dr. Jacques Vallee, a computer scientist and UFO expert who was portrayed by director-actor Francois Truffaut in the popular film "Close Encounters of the Third Kind," has won a National Science Foundation grant to develop the first formal representation encompassing all types of electronic message systems (EMS).

Vallee and his colleagues at Infomedia Corp. here hope their efforts will result in a common set of standards and definitions that for the first time will allow users and designers to describe precisely the behavior of word processing systems, electronic mail networks and teleconferencing systems.

Although Infomedia will shoulder most of the project burden itself, Vallee and his research director, Richard Miller, will rely heavily on the advice of a panel of outside experts, including some of the leading figures in

the EMS field.

Work on the project began April 15 and will end when the \$41,700 grant expires on May 31, 1980.

Vallee, who heads Infomedia, hopes the representation developed by his data communications and teleconferencing firm will serve as a technical lingua franca for the disparate elements of the EMS field.

To date, the discipline has been splintered by a kind of computer industry Babel. Groups interested in EMS have found themselves unable to effectively describe their work to each other because each party in effect has been speaking in a different technical language.

Users haven't been able to precisely explain their needs to suppliers, and suppliers in turn haven't been able to accurately describe their offerings to users. As a result, confusion has reigned and the pace of EMS development has lagged badly.

Vallee proposes to end the chaos and speed the rate of technology transfer by replacing the mishmash of EMS languages with a single, common "tongue" peculiarly suited to express data communications concepts and processes.

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## EDITORIAL

### A Loss We Can't Afford

Can computer technology continue its rapid rate of development if the bulk of experimental research in computer science is conducted outside universities?

No, according to a National Science Foundation (NSF) committee comprised of four academicians and four industry executives. That's why the committee finds the current migration of computer scientists from universities to private firms appalling and has called for immediate funding of academic programs in experimental computing from both government and industry.

Without denying the importance of computer science research at corporate centers such as IBM's Yorktown, N.Y., operation, Xerox Corp.'s Palo Alto, (Calif.), Research Center and Bell Laboratories, the NSF committee has found university projects to be necessary if the U.S. is to retain its preeminence in computer technology.

Addressed to the plight of experimental, rather than theoretical, computer science, the committee found that academic computing facilities are largely obsolete as research tools. This condition, attributed to a lack of financial support, has reportedly prompted many of the nation's finest computer scientists to leave universities for jobs in industry.

"The current pace of technological change is so rapid as to make a large portion of this capital equipment obsolete every few years," the committee added.

Firms fully or partly involved in the computer industry are among the nation's top spenders in R&D, according to figures just released by Compustat Service, Inc. IBM and AT&T are the third and fourth biggest spenders, respectively.

When R&D spending is figured as a percentage of sales, Comten (recently acquired by NCR Corp.), Intel Corp., Data General Corp., Systems Engineering Laboratories and Hewlett-Packard Co. are among the top 10 R&D investors. In R&D dollars per employee, Amdahl Corp. is the nation's second biggest spender, and Communications Satellite (Comsat) and Comten are also in the top 10.

But the NSF committee's point is well taken: University computer science departments, though not — as such — addressed to DP, form a crucial component in the process by which DP grows in benefiting mankind.

The computer industry literally cannot afford to allow these departments to degenerate.

## DATA PAST

Five Years Ago  
July 3, 1974

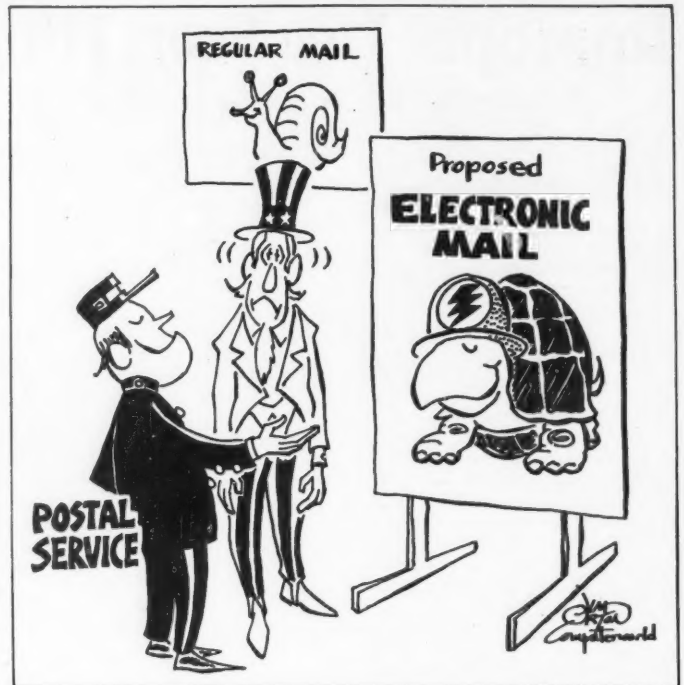
WASHINGTON, D.C. — New York State was thrown out of the Federal Bureau of Investigation's Computerized Criminal History (CCH) system after a protracted dispute over updating criminal history information. The New York case was the first instance in which a state was forced out of the system because of a failure to update "rap sheet" information held in the CCH files, sources indicated.

NEW YORK — IBM indicated that the government might be using threats of Internal Revenue Service investigations in an effort to scare individuals who agreed to testify for IBM in its antitrust suit. In a motion filed with the U.S. District Court here, IBM asked the court to order the Justice Department to conduct an investigation into the allegations.

Eight Years Ago  
July 6, 1971

ATLANTA — Charging "false and fraudulent misrepresentations" and "erroneous processing," Computer Credit Systems, Inc., a customer of a Control Data Corp. service center, filed an \$8 million malpractice suit against the mainframe maker's service organization. The alleged "misrepresentations" included CDC's claims that the Cybernet time-sharing system had adequate backup and that CDC's charge for computerized billing work would be less than that of a service bureau previously used by the customer.

WASHINGTON, D.C. — The IBM Black Workers Alliance urged IBM to withdraw from South Africa because of that country's policy of apartheid.



## LETTERS

### Correcting Algorithm

To make it work, step 4B in TGIF algorithm #4 [CW, June 4] should divide the result by 4 instead of 2.

Neil H. Mietz

New York, N.Y.

### Is It Worth It?

A friend of mine who is a microcomputer designer was telling me of a guest he saw on Tom Snyder's "Tomorrow" show. The man was a well-known physiologist specializing in the human brain. According to him, within 10 years we will know enough of how the brain passes and processes information to actually hook a computer to it.

The brain would send information to the computer for storage or computation and retrieve the answer with just a thought. An example cited was knowing the distance between any two points on an XYZ plane simply by finding their coordinates.

My friend thought that such a computer could be built within five years and in another five refined to the point of actually being implanted somewhere on the human body. Thus, the human would always have access to super memory and super computing power whenever he thought of it. Sounds wonderful, doesn't it?

Or does it?

While we can make it work properly, do we really know the long-term effects? Are we wise enough to foresee all the possible problems that could arise, or do we go ahead on a trial-and-error basis?

What about the effect on human psychology? Is the human mind capable of controlling such a powerful device which would always beckon to be used?

These questions cannot be answered in advance, and maybe not even in retrospect. But I fear our scientists, biologists and physiologists will go ahead in

the name of progress and build such a machine. And in due time that machine may become part of us.

Perhaps the logical place for the micro is on the tip of our ear, with megabytes of bubble memory on the other. Throw in a little genetic engineering and we all can become Vulcans.

In the name of progress, is it really worth it?

G.P. Gerhard

Columbus, Ohio

### System a 'Bad Actor'

Permit this observation from someone with a 15-year involvement in the design of nuclear power plant computer systems. The plant information computer featured in "The China Syndrome" ["Computers Play Varied Movie Roles," CW, June 18] was a bad actor whose performance was extremely naive, at best.

Would that power plant operation were as simple as depicted in the film, where the computer so neatly bracketed the plant incident with "START OF EVENT" and "END OF EVENT" messages. It just isn't so!

Peter Kushkowski

Haddam, Conn.

### On 'Counterimplementation'

I enjoyed Peter Keen's comments on "counter implementation" ["How to Kill a Bad Idea," CW, June 11], but he omitted an important consideration. Bad ideas are not the only ones easily dealt with in this manner; since good ideas do "good" in some way or other (by definition), they require more effective planning and implementation (and are therefore more susceptible to counterimplementing) than bad ones are.

As such, "counterimplementation" is actually the kind of tool one pays consultants to present to competitors.

R.L. Vivian Jr.

Kingston, N.Y.



## WHITE HAT — BLACK HAT /Herb Grosch

# Resources Ample for 'Public' Energy Model

Recently I came across a curiously significant remark in an article about the energy problem. Rehearsing the dozens of options — nuclear, petroleum, gas, oil shale, coal, solar, biomass, tidal and wave — it listed the types of consumption, the geographical differences, the tax complications and the international frictions. "It's hopelessly complicated," the authors moaned.

But it isn't, you know! Compared with landing Armstrong and Co. on the moon 10 (yes, only 10) years ago, compared with the production scheduling problems at the F-16 plant in Fort Worth, compared even with the nuclear weapons and nuclear power plant simulations of the dopey Department of Energy (DOE) itself, a flow

model for energy production and consumption is child's play. People at Rand and in the Pentagon were doing more complex and difficult models in the '50s, for Heaven's sake. In fact, such energy models must certainly already exist, in DOE and Defense and the Central Intelligence Agency, at Brookings and Rand, in every major oil company worldwide.

*Time* and *Fortune* and *Business Week* carry page after page of technical and economic commentary. We hear of \$20.26 Ecuadorian oil, of gasohol [horrid name!] in Brazil and far Nebraska, of solar energy successes and failures up and down North America.

Where are the models, where are the simulations, where are the lists of input parameters and predicted out-

comes that computers somewhere — big, sexy, powerful, well-supported computers — are certainly churning out? No one tells us!

Back in November 1973, a week or two after the first gasoline panic began, I wrote a piece for *Computerworld* called "A Carnival of Greed." I accused the energy boys of a corporate ripoff "on the very grandest national scale," stated my belief that we had only a tiny dependence (in the autumn of 1973, you understand) on Saudi oil and called for something like Jimmy Carter's "windfall profits" tax.

I doubt if many readers would find anything startling in the column if they reread it today, but there was vigorous dissent at the time. Oil company DP managers wrote in, scandalized.

Ayn Rand enthusiasts surfaced. Lots of reasonable people told me I simply had my facts wrong.

## Replaying Drama

Now we replay the drama. The stage is set much more carefully; the directors are far more sophisticated. The public relations people at Mobil have done their best to soften us up. We are manipulated openly and covertly in almost every medium.

I mentioned *Time*: In the same story that told us the price of Ecuadorian oil, but was unable or unwilling to tell us how many Ecuadorian barrels we buy at that price, the magazine ran a box story about the enormous oil company profits: "first quarter earnings... will probably show increases of the order of 20% to 40% or more over the first quarter of 1978," it said. The headline read, "Those 'Large' Oil Profits." Where did the quotes come from? Did *Time* mean "Large" was funny; that the real word should have been "Enormous," "Fantastic," "Indefensible"? You bet it didn't!!

Let's get back to models and computer capabilities. Could we build a public energy model, accessible to the unions and the media and the professoriat? We could, for a few paltry dollars.

If we did, could we get the real facts to put in as parameters? Not without a terrific struggle; the Petroleum Institute, the energy companies — coal and so forth, as well as oil — would resist as ferociously as IBM does when defending its customer list.

Example: I had a dozen letters in response to my 1973 column, ridiculing

(Continued on Page 16)

## HUMAN CONNECTION/Jack Stone

# DPers Surveyed on Management

Criticisms of top management occupy much of the tongue-wagging around favored DP watering holes.

Of course, some of it is justified, some is not. Now, thanks to the good offices of Deutsch, Shea & Evans, a New York City consulting firm, we have some documentation on how DPers feel about management.

The consultants recently conducted a career study of more than 1,000 DP people, a group spanning a wide range of ages, educational backgrounds, training, job experience and geography. Although many interesting issues were covered in the survey, I want to discuss only those findings that relate to DPers' attitudes towards management. But to maintain the suspense until you acquire your own copy of the report, I won't reveal too much quantitative information.

But first, some introductory remarks. There are many charges leveled at "management," a term DPers use to describe all of those folks above the level of the management information systems director (or equivalent title). Critics say management possesses a seemingly unnatural abhorrence to "getting involved" with the systems process, is ultraconservative in the exploitation of the technology on today's systems issue and is too radical on tomorrow's. They also see an overweening interest in organizational power politics, to the possible detriment of the "health and security" of the DP function; the promulgation of the notion that "DPers are really different"; and a lack of receptivity for capitalizing on new applications opportunities, particularly when the initial ideas come up from the DP shop.

All of this amounts to what the critics describe as management's "lack of appreciation" for the information systems department.

Well, the survey design team attacked this issue head-on by asking the question, "Do you think your company's management adequately appreciates the contribution to overall company operations made by the DP department?"

A slight majority answered "yes," a third replied with a "no" and the balance was uncertain or didn't answer.

## Sign of Progress

I believe this finding is very significant. Even though many of the majority represented computer services firms, it tells me that much progress has been made in building effective relationships between management and the DP organization.

But there's quite a way yet to go. For example, when asked why they thought so, nearly all of the "noes" re-

sponded, perhaps indicating a high level of frustration.

Many of the comments received from the "yesses" indicated that, quoting from the report, "such appreciation is based upon the EDP function being the company's main or only business, its 'money maker' or profit center."

An obvious conclusion at this juncture is this: If top management really wants to get its money's worth from the DP activity, management should treat DP with some respect and give it a primary role to play in building the

(Continued on Page 16)

## THE TAYLOR REPORT/Alan Taylor

# Tape Libraries Hold New Power

Tape libraries and tape librarians do not have a reputation of being important in the scheme of a data processing department. While it might be putting matters a little strongly to say they are there to economize in the number of peripheral operators, few programmers and analysts would be able to describe just what a tape librarian does other than check tapes and disks in and out, maintain tape cleanliness and, perhaps, look after report distribution.

Certainly, if the programmers and analysts I know were asked whether the tape librarian function could develop to influence the systems analysis and programming roles in the overall situation, the answer would be a firm "no," coupled with an inquiry as to whether I felt well!

Yet, surprisingly, it begins to look as though tape libraries may hold the seed of responsible DP, just as the treasurer's department in a company is the seed of responsible fiscal operations.

There is more than a mild similarity between the function of a treasurer and that of a librarian. They are both responsible for looking after the valuable objects others have produced so

that those others can continue to produce without having to worry about safeguarding their products. Thus, the treasurer looks after revenues, without either the salesman or factory manager having to take time out from his own, more productive duties. In much the same way, operators and programmers produce programs and data tapes and let the tape librarian look after them while they carry on and produce more of the same.

## Balancing Acts

In the case of the treasurer, however, new functions were added as the separate interests of the various owners of the firm came into play. In order to protect each one's interest, all finances had to be accounted for, and that became the treasurer's task.

So, all of a sudden, the treasurer, who had been the unproductive servant of the productive factory and sales departments, attained a new importance and in some ways controlled the productive departments, telling them whether what they were producing and reporting was of acceptable quality. Now, the same key factor — split ownership of value — is at work in DP.

DP operations only have value when the factory (the programmers) produces and the operations people use the product for some end result. The split between them and the need to get as much value out of the product as possible is making the data library (to give it its more modern name) the main control point.

This development seems to be inevitable. If programs and data are left around, anything that goes wrong will be blamed upon the operators, who will deny the blame. Someone has to be responsible, and that person, more and more, is the librarian.

But the contents of the libraries are growing. In addition to machine-readable data, the modern DP library contains system documentation, log books, operational instructions, user manuals, revision procedures, maintenance requirements and so on. In some cases, it contains the whole history of the project from the specifications to the last runs as well as runs scheduled for the future. It has become the "treasury" of the DP system, and its role is still growing.

What the library's role is becoming

(Continued on Page 16)

# DPers Could Construct 'Public' Energy Model

(Continued from Page 15)

my statement that Arabian oil constituted only 2 percent of our 1973 petroleum inflow. I would guess that 1973 percentage is higher today, although not much higher.

But the point is, I have never seen, in the intervening five or six years, any figure more authoritative than mine. I don't know to this day what the right number was. And there is such a number! We certainly know fairly closely what total crude oil consumption was in late 1973. We have been told many times what total percentage was "imported."

The oil companies must, collectively (probably via the American Petroleum Institute), know exactly what the im-

ported amounts were in 1973 from every source — Canada, Nigeria, Saudi Arabia, even Mexico and Ecuador, if any, or Soviet Russia. I would hope, but am not at all certain, that the federal government, which presumably has some slight concern with imports in the billion-dollar class, would also know. How much was Arabian?

## Why Don't We Know?

Why don't we know? Why doesn't *Fortune*, or *Business Week*, or *The New York Times* tell us how much we buy and at what prices, from every overseas and domestic source? I believe the figures exist, can be searched out or even, as a last resort, subpoenaed. But without them, reasoned guesses can be put into the models, and sensitivity analyses we computer types have long known how to do can warn us of the influence of particular lacunae on important results.

The enormous processing speeds and tremendous memories of today's machines, hundreds of times better than

those used by the Air Force and the Atomic Energy Commission in the '50s, would enable us to build models of very fine grain, with every oil or coal field, every refinery, every super-tanker explicitly detailed. We have software tools that enable us to compile models and to automate the submission of input values.

And note that there are only vestigial human loose couplings in the system. Problems of consumer acceptance (electric cars, burning dirtier coal) are second- and third-order effects. Mostly the patterns of energy, material and money flows are completely determinate and linear, much like the enormous Leontiev input-output matrix with which BASF ran the world's largest chemical plant in the early '60s at Ludwigshafen.

We could do it. DOE could do it. Rand or Brookings or Wharton could do it. IBM, as a public service, could easily do it.

The confused public, the media, the senators and congressmen, the univer-

sity economists, the executives of the smaller and less wealthy energy producers and consumers, could have access. We could ask, "If solar cells produce replacement electricity at 5 cents per kilowatt-hour in southern Arizona, how much would New York City utility bills go up if we shut down Indian Point?" Or, "If we produced sugarcane alcohol in Louisiana for \$30 a barrel, how much would the price of automobile fuel go up in New England if we went to 5%, 10%, 20% alcohol content and discontinued importing an equivalent amount of Iranian oil?"

Yes, we could do it. Our machines, our people, our resources are ample. What we need is courage, leadership, imagination. More Kahns and less Schlesingers — in fact, no Schlesingers at all! Some money — but not an awful lot; some political backing — but not so much as to prejudice the program; an institute or university or laboratory to house the work.

It could be under way in a week and have some results in a year. Let's try!

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## Attitudes Toward Management Solicited

(Continued from Page 15)

profitability of the business. And I would judge that the perception of management in general business must be as positive toward DP as that of the president of the local service bureau, if true success is to be achieved.

Another group of the "yesses" noted that management appreciation was ev-

ident from its "positive attitude and actions," which suggest, according to the report, "that it is principally good communications between management and its EDP professionals that [these respondents] have in mind."

This finding should come as no surprise. "Positive attitude and actions" are not limited to a once-a-year review of the five-year DP plan. They are inextricably involved with the very human (and inhuman) ways in which management relates to the DP people.

It has been my experience that top managements seem polarized in their views toward DPers: they either love 'em or leave 'em. And for the latter group, it matters not whether the atti-

tude is born of fear or hate or distrust or ignorance.

What does matter is that management must learn to control its biases and work with the DPers in a cooperative, constructive manner, because the viability of the business will depend on the successful performance of the DP organization.

(Inquiries regarding the survey, titled "Profile of the EDP Professional," should be directed to Deutsch, Shea & Evans, Inc., 49 E. 53rd St., New York, N.Y. 10022.)

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave., N.W., Washington, D.C. 20007.

## Tape Libraries Taking On New Control Function

(Continued from Page 15)

could also be seen by looking at jointly owned corporations. There, it is necessary that each owner's interests be protected by accuracy, and this in turn means that an audit has to take place. Audits, like the treasury itself, are overhead, so the efficient business tries to minimize their cost and does this by concentrating in one place all the items dealing with a single subject.

Similarly, as DP auditing advances and finds its place in the scheme of things, the auditors will see in the library the security situation that makes it the suitable repository for procedures and controls. The audit of a system will be — and in some cases is being — performed primarily in the library.

If at audit time something is not included in the library-held documentation, the procedure of control can be said to be improperly loose — even though the actual item is in fact later found in the bottom drawer of a programmer's or operator's desk!

Still, now, the tape librarians have a professional society, the Data Processing and Documentation Managers Association, to act as a focus of future

professionalism. Matters are on the move, and DP management would be foolish not to look anew at the library and see how its role can be expanded in the future.

The facts of history quite clearly indicate that an expanded role for the library will benefit all the multiple "owners" of DP systems, and achieving such benefits by organization is the task of DP management.

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## READER COMMENTARY/ Andy Pauker

## Strategy Leads to 'Knight's Tour' Solution

There is a well-known puzzle called the Knight's Tour Problem. The object is to have a knight traverse the 64 squares of a chess board, occupying each square once and only once.

For those unfamiliar with chess, a knight jumps in an L-shaped manner. It moves two spaces north, south, east or west and lands on one of the squares at right angles to this movement.

For example, a knight at d3 (see Figure A) has eight moves: c1, b2, b4, c5, e5, f4, f2 or e1. A knight at h1 would have two moves, f2 and g3. There is a maximum of eight moves, fewer if the knight is near the edge of the board or if some squares have been previously occupied.

There are many ways of attacking the problem, and therefore many kinds of programs can be written to find a solution. One approach is to choose from available next moves by a system such as random choice or first available

clockwise move.

Store the choice and record that this new position has been occupied. Should the knight run into a dead end (a position with no next move) before finishing the tour, he must change his itinerary. Erase the last move, back up and try another move from this position.

This exhaustive method will yield a solution, but it takes time, hours of computer time, since the number of ways of achieving a dead end is far greater than the number of solutions.

## More Efficient Approach

I propose that a strategy is more efficient and can eliminate the exhaustion. A computer is very useful for rote work but is most useful when it can most closely imitate the human thought processes.

Attempting the problem by hand, we might find the corners and edges have fewer ways in, and hence fewer ways

out. We need to visit them while they are still accessible, that is, before they become dead ends. By the same reasoning, when we find squares where many ways in and out have already been taken, we want to get in and out while we can.

Let us call the maximum of eight next moves first-level moves and each of the maximum of 64 following moves second-level moves. A strategy which implements our previous idea is one where we choose from the available first-level moves the one with the fewest possible second-level moves. This makes sure we head for those areas with the fewest paths in/out and occupy them first.

The first 20 moves with starting position g1 illustrate this procedure. (Figure B). The moves are numbered in order. Placing the knight on the board is move 1. Following our strategy, it moves to h3 next, then f2 and so on.

Starting at g1, there are three first-

level moves: e2, f3 and h3.

To find our next move, we need to count the number of second-level moves. E2 have five next moves (c1, c3, d4, f4, g3); f3 has seven (e1, d2, d4, e5, g5, h4, h2); h3 has three (f2, f4, g5). Hence, move number two, with the minimum of three second-level moves, will be h3. Notice how the strategy fills in the corners and the edge of the board first.

The complete solution for this starting position is shown in Figure C.

The next problem we encounter is what to do when there is more than one first-level move with the same minimum number of second-level moves. For example, there are eight first-level moves starting at d4, with four of them having the same minimum of five second-level moves.

## Method of Choice

Here we need a method of choice. Let us arbitrarily use a clockwise priority. We rank the eight possible directions. Two squares south/one west has highest priority and two west/one south second, continuing in a clockwise direction until two south/one east has last priority.

So, when there is more than one first-level move with the same minimum number of second-level moves, we choose the one with highest priority. In our example, the next move after d4 would be c1.

A program in Basic with this strategy takes about three minutes for one solution (Fortran takes about five minutes for all 64). The program below supplies a solution for 63 of the 64 starting positions. The one problem case at d6 has a solution if we simply choose a counterclockwise priority.

Of these 63 solutions, four are perfect. That is, the knight on its 64th move could jump back to square one and then would follow the exact same route ad infinitum.

Pauker is a high school math teacher.

8							
7							
6							
5			X		X		
4		X				X	
3				Kn			
2		X				X	
1			X		X		
	a	b	c	d	e	f	g

Figure A

8			12				10
7	13				11		
6							9
5		14					
4						8	
3	15	18				5	2
2			20	17	3		7
1	19	16			6	1	4
	a	b	c	d	e	f	g

Figure B

8	32	35	12	59	54	37	10	63
7	13	58	33	36	11	62	51	38
6	34	31	60	55	50	53	64	9
5	57	14	49	46	61	26	39	52
4	30	47	56	25	40	45	8	23
3	15	18	41	48	27	24	5	2
2	42	29	20	17	44	3	22	7
1	19	16	43	28	21	6	1	4
	a	b	c	d	e	f	g	h

Figure C

```

10REM      A KNIGHT'S TOUR
11REM      LINES 50-160
12REM      LINES 160-250
13REM      LINES 250-320
14REM      LINES 320-400
15REM      LINES 400-440
16REM      LINES 440-500
17REM      LINES 500-550
18REM      LINES 550-600
19REM      LINES 600-650
20REM      LINES 650-700
21REM      LINES 700-750
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49REM      LINES 2100-2150
50REM      LINES 2150-2200
51REM      LINES 2200-2250
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62REM      LINES 2750-2800
63REM      LINES 2800-2850
64REM      LINES 2850-2900
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66REM      LINES 2950-3000
67REM      LINES 3000-3050
68REM      LINES 3050-3100
69REM      LINES 3100-3150
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88REM      LINES 4050-4100
89REM      LINES 4100-4150
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114REM      LINES 5350-5400
115REM      LINES 5400-5450
116REM      LINES 5450-5500
117REM      LINES 5500-5550
118REM      LINES 5550-5600
119REM      LINES 5600-5650
120REM      LINES 5650-5700
121REM      LINES 5700-5750
122REM      LINES 5750-5800
123REM      LINES 5800-5850
124REM      LINES 5850-5900
125REM      LINES 5900-5950
126REM      LINES 5950-6000
127REM      LINES 6000-6050
128REM      LINES 6050-6100
129REM      LINES 6100-6150
130REM      LINES 6150-6200
131REM      LINES 6200-6250
132REM      LINES 6250-6300
133REM      LINES 6300-6350
134REM      LINES 6350-6400
135REM      LINES 6400-6450
136REM      LINES 6450-6500
137REM      LINES 6500-6550
138REM      LINES 6550-6600
139REM      LINES 6600-6650
140REM      LINES 6650-6700
141REM      LINES 6700-6750
142REM      LINES 6750-6800
143REM      LINES 6800-6850
144REM      LINES 6850-6900
145REM      LINES 6900-6950
146REM      LINES 6950-7000
147REM      LINES 7000-7050
148REM      LINES 7050-7100
149REM      LINES 7100-7150
150REM      LINES 7150-7200
151REM      LINES 7200-7250
152REM      LINES 7250-7300
153REM      LINES 7300-7350
154REM      LINES 7350-7400
155REM      LINES 7400-7450
156REM      LINES 7450-7500
157REM      LINES 7500-7550
158REM      LINES 7550-7600
159REM      LINES 7600-7650
160REM      LINES 7650-7700
161REM      LINES 7700-7750
162REM      LINES 7750-7800
163REM      LINES 7800-7850
164REM      LINES 7850-7900
165REM      LINES 7900-7950
166REM      LINES 7950-8000
167REM      LINES 8000-8050
168REM      LINES 8050-8100
169REM      LINES 8100-8150
170REM      LINES 8150-8200
171REM      LINES 8200-8250
172REM      LINES 8250-8300
173REM      LINES 8300-8350
174REM      LINES 8350-8400
175REM      LINES 8400-8450
176REM      LINES 8450-8500
177REM      LINES 8500-8550
178REM      LINES 8550-8600
179REM      LINES 8600-8650
180REM      LINES 8650-8700
181REM      LINES 8700-8750
182REM      LINES 8750-8800
183REM      LINES 8800-8850
184REM      LINES 8850-8900
185REM      LINES 8900-8950
186REM      LINES 8950-9000
187REM      LINES 9000-9050
188REM      LINES 9050-9100
189REM      LINES 9100-9150
190REM      LINES 9150-9200
191REM      LINES 9200-9250
192REM      LINES 9250-9300
193REM      LINES 9300-9350
194REM      LINES 9350-9400
195REM      LINES 9400-9450
196REM      LINES 9450-9500
197REM      LINES 9500-9550
198REM      LINES 9550-9600
199REM      LINES 9600-9650
200REM      LINES 9650-9700
201REM      LINES 9700-9750
202REM      LINES 9750-9800
203REM      LINES 9800-9850
204REM      LINES 9850-9900
205REM      LINES 9900-9950
206REM      LINES 9950-10000

```

Program in Basic provides 63 solutions.

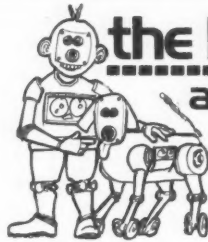
46	19	44	5	52	9	58	7
43	4	47	20	57	6	51	10
18	45	42	39	50	53	8	59
3	48	21	56	41	62	11	54
22	17	40	49	38	55	60	63
27	2	25	30	61	36	33	12
16	23	28	37	14	31	64	35
1	26	15	24	29	34	13	32
19	28	15	44	33	30	13	64
16	41	18	29	14	63	34	31
27	20	43	58	45	32	61	12
42	17	40	25	62	59	50	35
21	26	57	46	39	54	11	60
6	3	24	53	56	51	36	49
1	22	5	8	47	38	55	10
4	7	2	23	52	9	48	37
7	10	5	26	57	12	51	44
4	25	8	11	50	43	58	13
9	6	27	56	29	60	45	52
24	3	30	49	42	55	14	59
31	20	35	28	61	40	53	46
2	23	32	41	54	39	62	15
19	34	21	36	17	64	47	38
22	1	18	33	40	37	16	63
4	7	24	39	48	9	26	29
23	38	5	8	25	28	47	10
6	3	40	51	42	49	30	27
37	22	43	18	59	52	11	46
2	17	58	41	50	45	60	31
21	36	19	44	57	64	53	12
16	1	34	63	14	55	32	61
35	20	15	56	33	62	13	54

Typical Program Output

# BIT 9 (A BIT TOO FAR)

Simula, who had been locked in an upstairs room with Dr. Null, has been saved from a fate worse than death by the unexpected arrival of the garbage collector with two industrial robots. However, Dr. Null has escaped, taking Asci with him. Hex and Execute have set off to hunt down and capture Dr. Null, leaving Simula to tend the wounded Fetch. They have seen on the graphics terminal that Dr. Null is heading towards the infamous Silicon Valley reservation — one of the few places on earth where robots and androids fear to tread.

Hex and Execute followed Asci's trail through the night. By the afternoon of the next day, they had entered the rugged foothills of the Sierra Nueva (New Range), whose topmost peak rose 2,980 meters above sea level. The terrain was growing rougher un-



## the hexadecimal kid and his faithful dog ascii

A FANTASY  
IN SIXTEEN  
BITS

by  
Richard  
Forsyth

derfoot with every pace, and the sun beat down mercilessly.

"Come on," Execute urged, "it's not far now."

And, sure enough, when they crossed the ridge and looked down into the gulch beneath, they could see a couple of old-fashioned wooden huts.

"I hope they're on-line," Hex said as they scrambled down the slope. "I'm in no mood for messing about with remote batch."

In front of the huts stood a large billboard. It was obviously many years old and its crude lettering had been severely weathered: "Welcome to Sprocket's Hole (Frontier Trading Post): Coca-Cola, Human Artifacts, Ice Cream, Floppy Disco."

Execute rapped on the door of the nearest hut. The sound echoed from the surrounding hills. Nothing stirred. "Anyone at home?" he called out.

After a long interval, an android peered cautiously out of the cabin window. He was clearly a very early model: his face was wizened and he wore a racoon-skin cap. The head withdrew. Hex and Execute waited. Eventually the door creaked open and

the android stood before them. He held out his hand.

"Mighty pleased to see you folks," the stranger said. "We don't get many visitors round these parts nowadays."

Hex took his hand. "Glad to meet you. My name's Hex and this is my companion, Execute."

"I'm Sheriff Sprocket," the other replied. "You can call me Davy. Come inside and meet my deputy, Bill Bootstrap."

He led the way in, and Hex and Execute gingerly followed. Inside was another android, if possible even more disheveled and unkempt than the first. Davy Sprocket introduced them, and then said "I guess you all could use a byte to eat."

"We surely could," Hex replied.

Sheriff Sprocket motioned them towards an ancient terminal across the room. Hex caught his breath. It was an antique Teletype Model 33 — with paper tape reader/punch! He hadn't realized there were any still in service. "This is a museum piece," he thought, "it must be worth a fortune."

But he managed to say: "Thanks, we're very grateful to you." Then he logged in, marvelling at the noise made by its obsolete electromechanical printhead.

When Hex and Execute had had their fill, which took some time at 10 characters a second, Davy Sprocket invited them to sit with him and Bill Bootstrap round the table. "We call this our 'hash table,'" Sprocket announced, winking at Hex. He clapped his hands and a young girl appeared out of the shadows, bearing a tray with some dried leaves and a pipe on it. She placed it in front of Bill Bootstrap and then withdrew.

Hex's eyes grew wide. Not only were these hillbillies smoking tobacco (if nothing worse), which was expressly prohibited by the System, they were also apparently employing a human female as some sort of slave processor — a practice which was supposed to have died out years ago. "They're little better than humans," he thought.

Out of respect for their hospitality, Hex swallowed his suspicions and accepted the burning pipe.

Soon Hex relaxed and a friendly conversation developed, though Bill Bootstrap remained ominously taciturn throughout the evening.

Do you know what is in the pipe?

Have Davy Sprocket and Bill Bootstrap gone to pot?

Read the next mind-blowing installment!

Forsyth is software manager for RAIR Timesharing in the UK.

Copyright 1979, Richard Forsyth

# The Nodes Know.

Find out how much in our July 30th Special Report on *Distributed Processing*. As the cost of communication goes up and the price of hardware goes down, are minicomputers in a distributed network a more desirable alternative? Is distributed data processing the new wave of the future? Here are some of the issues we'll be taking a look at in this Special Report:

- When does an organization go to a DDP network?
- How can the change take place cost effectively and with a minimum of disruption to the organization?
- What are the potential drawbacks of having more intelligence and autonomy in the field?

Edited by Brad Schultz, this Special Report will provide answers to these questions along with a discussion of the profound impact DDP is having today on the internal operations of large organizations.

If you're a user who watches the trends, you'll want to have the most up-to-date information about DDP and you'll find it in our July 30th report. Closing date is July 13th.

And if you're marketing products or services in the DP field, you'll want to make sure your ad is there. Contact your *Computerworld* salesman, or call Frank Collins at (617) 965-5800.



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## Security Tightened Recoding Eases 'Panexec' Problems

By Don Leavitt  
CW Staff

OAK BROOK, Ill. — Version 3.0 of Panexec, the management and control system for executable libraries set up under DOS/VS or OS/VS, includes both enhancements and "fixes" to problems the product has had since it was introduced in February 1978.

Major features of Panexec are a multilevel password security system, cross-reference reporting between source and executable modules, executable library utilities, a management report-generating facility and Dasd error handling, according to its vendor, Pansophic Systems, Inc.

Among the fixes in the OS/VS implementation of the update, Panexec's incompatibilities with IBM's Authorized Program Facility (APF) and Password Facility have been removed, a spokesman said. This was done by redefining the Panexec library as a partitioned data set rather than a direct access data set and by leaving the library open for Panexec-authorized operations while protecting it against others, he noted.

TSO, Vtam, Team and various internal routines of the operating system are programmed to look for the partitioned data set organization before performing authorized program checking, the spokesman said. Being open for Panexec operations, the library is still secured by password protection against accidental or deliberate destruction by a user program or an IBM utility, he added.

On the DOS/VS implementation,

## 'Optimizer' Moved to DOS/VS

PHOENIX — DOS/VS installations can gain more efficient testing and debugging and, later, more efficient production programs through the facilities of new release of the Optimizer III package from Capex Corp., a vendor spokesman claimed.

Previously available only for IBM OS and OS/VS shops, the Capex Optimizer traces the entire logic flow of the user's Cobol program and identifies those portions of the generated code that are not — indeed cannot — be used if the program remains unchanged. It not only identifies but eliminates compiler-generated code that has no purpose in the specific application.

The compiler generates, for example, a dummy exit at the end of each paragraph in the Procedure Division. This exit logic comes into play only when a paragraph is at the end of a segment of code being defined — and used — by a PERFORM statement.

Optimizer can determine which exits are in

Panexec's linkage editor now has true "Auto Call" support. The editor will search private and system relocatable libraries for unresolved external reference. This facility is also extended to include processing, the spokesman said.

Panexec supports Information Descriptor Records (IDR) and System Status Index (SSI) information for both DOS/VS and OS/VS. This provides advantages over standard IBM software, the spokesman claimed.

The OS user has SSI support for all Panexec members whereas IBM support was limited to executable programs; the DOS/VS has these facilities for the first time, according to Pansophic.

## IMS, CICS Users Gain Support In Updating of 'Datamanager'

LEXINGTON, Mass. — Release 2.1.1 of the Datamanager data dictionary software from MSP, Inc. has enhanced support for installations using IBM's CICS and IMS and some extensions for other data base management systems (DBMS) as well, according to a spokesman.

With the update, IMS users can define Process Clauses or program views of the IMS data base to the dictionary. These logical views are sometimes called schemata, sometimes subschemata, in other DBMS environments, the spokesman explained.

fact utilized by the program being tested, so it saves them and eliminates all others.

As an offshoot of the Optimizer analysis, user code that is unreachable — usually because the test that might have led to it was incomplete — is also identified and eliminated.

The net effect of the Optimizer revamp of the user program typically is a smaller, more efficient program that runs more than 20% faster with less paging in main storage, the spokesman said. CPU requirements are often reduced by at least 10% and storage size by more than 20%, the company claimed.

Cost of the DOS Optimizer III package varies with the type of equipment the user has installed. Those installations with IBM 370/148 or smaller CPUs may have the software for \$10,800; those with larger systems face a \$13,800 price tag.

Capex can be reached through P.O. Box 13529, Phoenix, Ariz. 85002.

The Panexec command procedure processing under both DOS/VS and OS/VS has been enhanced. In addition to greater flexibility, it includes a print option facility which allows messages to be sent to user-designated locations.

The linkage editor has also been improved in performance and flexibility. Processing time has decreased 25% to 30%, the spokesman said, adding that the user can now control the amount of main memory allocated to linked tables.

The package costs \$15,000 for OS/VS installations and \$12,000 for DOS/VS sites. Monthly lease and rental plans are also available, Pansophic noted from 709 Enterprise Drive, Oak Brook, Ill. 60521.

Another facility provides for the automatic generation of IMS Data Base Definitions (DBD) from the dictionary, he noted.

Extensions to the CICS facilities under Datamanager, POST/MAIL allows the user to extract selected information from the dictionary at will while the PERFORM command is a major aid in multiple-level interrogations, the vendor said.

Support for synonyms is available in the update for IMS physical segments and Gsam data bases, as well as files under Cincom Systems, Inc.'s Total DBMS or files and groups not controlled by any higher level software, the spokesman continued.

Users of the Datamanager-Adabas interface have gained support allowing them "considerable exercise" of user options in the generation of Adawan loader definition parameters, he said.

A command has been introduced which can change the disk space allocation for any dictionary data set without having to initiate a complete reorganization. Release 2.1.1 also aids the generation of PL/I INITIAL attributes and Assembler EQU statements.

Training material now includes an example of data dictionary implementation which steps the user from system design through naming conventions and setup to wholesale use of the interrogation and reporting commands.

The basic Datamanager — which runs in any IBM 360 or 370 environment — costs \$12,000. As many as 20 extra-cost selectable units are available for \$2,700 each, MSP noted from 21 Worthen Road, Lexington, Mass. 02173.

## Random Notes

### Data Base Design Courses Available

ELK GROVE VILLAGE, Ill. — A three-module, video-assisted instruction course entitled "Data Base: Constructing a Logical Design" has been announced by Advanced Systems, Inc. (ASI).

It is a companion to the five-module course, "Data Base: Deriving Logical Data Relations," introduced earlier this year as part of ASI's Advanced Information Technology Curriculum.

Both courses are targeted at the

design-level audience. Others in the series include concepts and terminology, management strategies and administration, advanced design topics and manufacturers' implementation, ASI said from 1601 Tonne Road, Elk Grove Village, Ill. 60007.

### Wall Chart Outlines System Development

PHILADELPHIA — Atlantic Software, Inc. has developed and is giving away copies of a four-color wall chart that illustrates the system development life cycle, from service request through

postimplementation audit.

The chart breaks the cycle into 10 steps color-coded to make clear whether responsibility lies with the user or technician.

The types of review needed between steps and the allocation of costs by steps are also shown, a spokesman said from 5th and Chestnut, Philadelphia, Pa. 19106.

### Sheets Show Coding For Microprograms

PETERBOROUGH, N.H. — Two-sided coding sheets to preserve assembly language pro-

grams for 8080A, Z80, 1802, 6800 and 6502 microprocessors are available now in padded form from Bits, Inc.

The forms allow the user to show register use, stack manipulation and index addressing on one side; the program or subroutine listing — first in source statements, then in object code — is shown on the reverse.

The 50-sheet pads cost \$2.50 each plus postage and handling (75 cents per pad, \$1.25 for two or more) from Bits, Inc., P.O. Box 428, 25 Rte 101W, Peterborough, N.H. 03458.

# DP Service Firm Eases Use of Shared DASD

By Andreas F. Geissbuehler  
Special to CW

When we installed our second computer at L'Industrielle-Services Techniques (IST), a Montreal-based DP services company, we decided to create a multiaccess, shared spool complex. Since both the IBM 370/168 and the Amdahl Corp. 470V/6 are able to share a common spool disk, it was assumed that a job submitted on one machine could be processed on the other.

In theory, such a system should work as a result of the shared DASD support in the MVS operating system and the additional hardware features built into the disk control units. In practice, however, only a very few utility programs and even fewer application programs make use of this shared DASD support.

To make use of this support, the programs must protect against simultaneous file updates from two different machines by issuing what is called a "reserve." A "reserve" command causes the disk controller to lock one

path to one CPU and pass "busy" signals across the other path to the other CPU. Failing this, either CPU can access a disk drive when it is "free."

Bingo! The standard protection mechanisms used by everybody, including the operating system itself, are adequate when shared DASD is not used. However, when using shared DASD, MVS needs additional help to protect user data sets adequately.

Through Share, one of the IBM user groups, we were able to study a solution for IBM's MVT operating system originally developed by Standard Oil Co. — an opportunity for which we were very grateful — and we developed a system software package of our own.

The principle of the package is quite simple. It carries the standard resource protection recordings from one machine to the other and "implants" them there in such a way that the other operating system believes that they originated from one of its own users.

Having done that in both directions, the operating systems can protect their

users in the fashion to which they were accustomed before the complexities of shared disk were introduced.

## Launching SNQ

Two years ago, the second computer arrived equipped with a channel-to-channel adapter called a CTC — the key hardware component of our shared enqueue (SNQ) program. The software component of SNQ was designed in such a way that after the operating system is loaded, our SNQ starts up automatically and "hooks" itself into the MVS data set/resource protection mechanisms, called "ENQ/DEQ."

Once SNQ is ready, it attempts to establish communication with its counterpart running in the other machine by sending messages across the CTC at channel speed. When the two SNQs are talking to each other, they make sure that "their" operating system does not grant control over a resource when in fact another user on the other system is already using this resource.

This is done by transmitting to each other the "enqueues" that describe the resource usage requests and grant the permission to "go ahead."

Now that the two SNQs know who "has" it and who "wants" it, they can control more effectively on their own what the shared DASD support of the operating system was supposed to protect. This results in the elimination of many unnecessary and costly hardware "reserves" which lock out all users of a given disk pack or spindle even if there is no danger of loss of data integrity.

The benefits of this "reserve" elimination are fewer interlocks and fewer "waits" for what used to appear as a "busy" device. As you might have guessed, interlocks occur when one machine has the "reserve" on a device, waiting to access a device "reserved" by the other machine — and vice versa.

## Handling a Crash

In the event the CTC hardware becomes inoperative, SNQ automatically activates a shared disk message queue to maintain communication with the other CPU. If either system crashes, the SNQ in the other system recognizes the disruption of its communication and frees up any resources held on behalf of the failing system.

Once the crashed system returns, it is told which resources are currently being used so that it can establish the proper protective environment prior to the start of the first job or TSO session. Only in the most difficult circumstances does it have to rely on an operator to make a decision. For that reason, SNQ is almost completely transparent.

Since it "hooks" itself into the operating system at start-up time, there is no need to modify the system. The impact on maintenance is small, and migration to the next operating system version is easy. This also means that the machines can run even if SNQ is inactive and that it can be stopped at any time to return the machines to stand-alone processing mode.

With SNQ, jobs can be picked up by the next free initiator of either machine, giving users better turnaround while maintaining the integrity of the shared data sets. To IST, it means effective dynamic load-balancing of two large computer systems, where one CPU can help the other one by taking advantage of momentary slack to accommodate the other's peak load.

Since SNQ uses a low overhead/fast response channel-to-channel adapter, its overhead is negligible. Furthermore, it probably pays for itself by eliminating many unnecessary hardware "reserves."

It has also helped us avoid upgrading to JES3, which at least at the time was felt to be much more costly than our winning multiaccess JES2/SNQ combination. And lastly, IST was able to offer its clients the benefits of the single system image at very competitive prices.

IST is not, at least presently, marketing the SNQ software. However, SNQ should be installed soon at another site as a direct result of a presentation given by IST at Share 50 in Boston last year.

Geissbuehler is manager of research and development at L'Industrielle-Services Techniques in Montreal.

# Precompiler Cuts Cobol Coding Effort

GLENDALE, N.Y. — Speedcobol from the Foundation for Software Engineering precompiles abbreviated Cobol to create full and complete standard Cobol source statements ready for compiler input. It can be used on any CPU with 50K bytes available if it supports Cobol, a spokesman noted.

The package features user-defined,

table-driven abbreviation translations and a suggested set of Cobol reserved word and phrase abbreviation translations. It also supports the definition of installation, system and this-program-only abbreviation translations, the spokesman said.

The precompiler has the ability to expand Cobol comment statements as

well as regular code, to expand maintenance or update changes going into existing programs as well as completely new program development and to provide end-of-job statistics illustrating how much coding and keying Speedcobol saved, he continued.

Speedcobol provides self-documenting abbreviation translation directories; parallel listing of input and output; column 1 to 6 sequencing and column 73 to 80 insertion; and Cobol card image output to cards, tape or disk or any combination of these media, the spokesman said.

The package is available on a permanent license basis for \$5,000 from the Foundation for Software Engineering, 81-27 88th St., Glendale, N.Y. 11227.

## Vendor Supports Analysis System

SAN JOSE, Calif. — Data-Text, a social data analysis system developed at Harvard University under the direction of Dr. David C. Armor, is now available from Pro Systems for use on IBM 360, 370 or compatible CPUs running under OS or OS/VS.

Functions included in the Data-Text package include basic statistical routines along with cross-statistics, general analysis of variance and co-variance, multiple regression analysis, correlation analysis and automatic handling of missing data values.

DP-oriented capabilities include support for the acceptance of column binary input, edit and validation procedures and update and merge facilities.

The software has been installed at more than 100 colleges and universities, nonprofit institutions and commercial organizations, the spokesman said, noting that Data-Text is offered on an annual lease basis for a first-year fee ranging from \$750 to \$2,000, depending on the status of the using organization.

Maintenance, enhancement and technical support is available.

Pro Systems is at Suite 234, 6561 Gilis Drive, San Jose, Calif. 95120.

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## High-Level Programming Supported on HP System

PALO ALTO, Calif. — Although the Hewlett-Packard Co. HP 300 was designed as a hardware system for the small business without a professional DP staff, such businesses often need applications that require more capability than the Business Basic or RPG that has been available until now.

That is the rationale behind HP's recent introduction of SL/300, a block-structured, high-level language based largely on Algol, which an HP spokesman said can provide good tools for "third-party program suppliers such as OEMs and other programming specialists."

The language is noteworthy particularly for its orderly support of multiple data types and data type conversions. Although SL/300 will make virtually any conversion the user specifies, it will generate a warning message whenever the requested conversion seems inappropriate, the spokesman noted.

Considered a high-level language because of its block structuring — which allows such logical niceties as local variables — SL/300 has been built "close enough to the hardware" so that it supports bit-level access to data, which most high-level languages cannot do, he claimed.

Data base management facilities — through a subset of Image — further enhance the power of SL/300 in tailoring applications, according to the company.

As an illustration of the faith HP puts in SL/300, the spokesman said the en-

tire operating system for the HP 300, the language subsystems, file and data base management facilities "and even the SL/300 compiler itself" are written in SL/300.

He acknowledged, however, that programs written in SL/300 are not necessarily compatible with SL/3000, a language facility available on the HP 3000 system. That appears to limit the use of the new language to those users without any need to grow into the larger equipment in the near future.

SL/300 is offered in the U.S. at \$80/mo plus an initial charge of \$2,000, HP's Inquiries Manager said from 1507 Page Mill Road, Palo Alto, Calif. 94304.

## 'SAS' Enhanced

RALEIGH, N.C. — Called a major new release of the Statistical Analysis System (SAS) from SAS Institute Inc., SAS.79 includes support for structured programming as well as various array processing statements, a spokeswoman said recently.

Intended for use in IBM OS or OS/VS environments, the updated system allows IF...THEN...ELSE structures to test conditions and then run the appropriate procedures. It also supports a DO/END statement to make it clear when DO loop coding is complete, she said.

Procedures added to the SAS library include such basic capabilities as tape copying and the printing of label information from IBM stan-

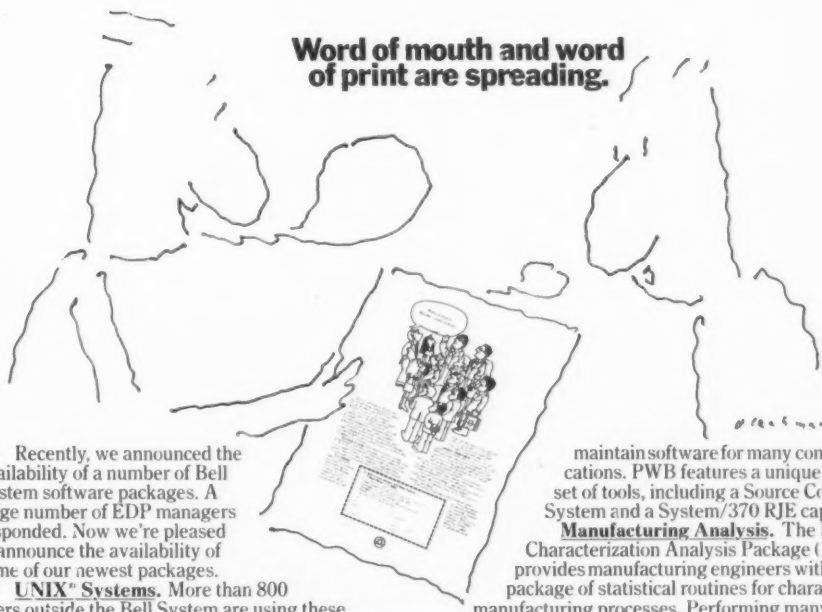
dard labeled tapes. But the package also has new bit-testing facilities and a range of routines specifically in support of statistical analysis.

A summary routine, for example, gives statistics for all possible subgroup combinations in just one pass of the data, without requiring any sorting, the spokeswoman noted. Other routines enhance the handling of univariate and multivariate analyses and of time series analysis.

SAS.79 runs in batch mode or under IBM's Time Sharing Option. The first year cost is \$4,500; subsequent years are \$1,500.

SAS Institute can be reached through P.O. Box 10066, 2806 Hillsborough St., Raleigh, N.C. 27605.

## Word of mouth and word of print are spreading.



## Courses Teach Use of DBMS

DETROIT — The internals of Burroughs Corp.'s data base management system, DMS-II, and factors to be considered in getting ready to use the system will be the subjects of two seminar/workshops to be held here in September under the sponsorship of MIS International, Inc.

The "Data Base Development and Programming Seminar," scheduled for Sept. 17-21, will examine the function and syntax of the Data and Structure Definition Language (Dasdl) and Cobol extensions provided as part of DMS-II.

The "Data Base Workshop," running Sept. 24-27, will study data base and system design, according to Stephen F. Crane, who will lead both courses.

Registration fees are \$625 and \$525 respectively and include technical manuals, course materials and lunches. Team discounts are available, the sponsor added from 31350 Smith Road, Romulus, Mich. 48174.

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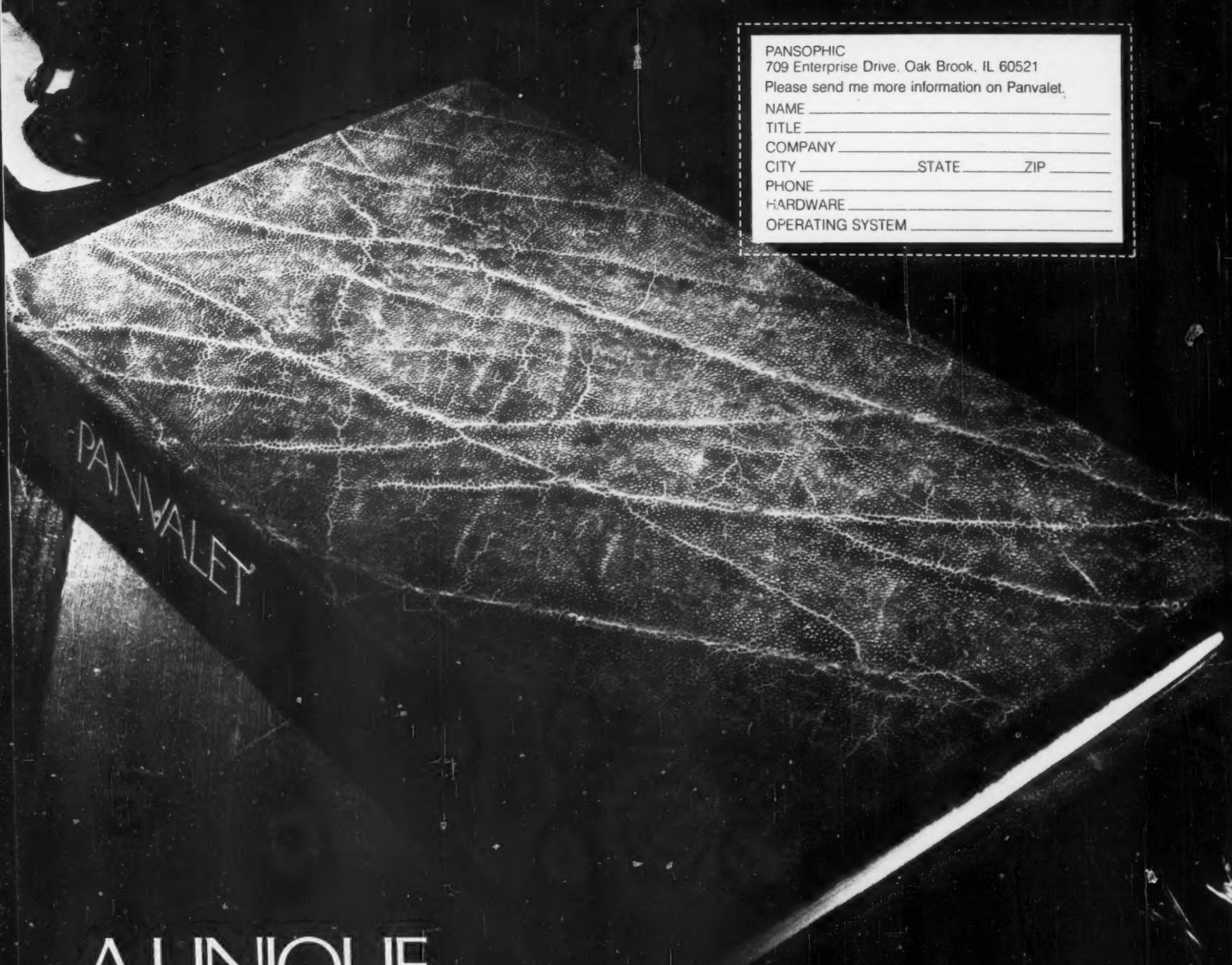
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C2-0

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SEE PAGE 27





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## Data Briefs

### Data Entry Station IBM 2780-Compatible

PALO ALTO, Calif. — Tab Products Co. has introduced an IBM 2780-compatible remote data entry station that reportedly combines binary synchronous communication with data entry and editing capabilities for distributed processing and off-line reporting.

Tab's System 700-60 transmits data in batch mode to a central computer system at speeds up to 9,600 bit/sec. The system transmits or receives data in single records of one to 128 characters or in 400-char. blocks when "expanded communications" are engaged, a spokesman said.

Prices for the System 700-60, which is available in single- or dual-station models, start at less than \$175, Tab added from 2690 Hanover St., Palo Alto, Calif. 94304.

### CRT Emulates DEC VT-52

ANAHEIM, Calif. — A CRT terminal that emulates the Digital Equipment Corp. VT-52 is available from Mini-Computer Systems, Inc.

The Midas-52 emulates the cursor control of the VT-52 terminal and adds editing and formatting to give more flexibility, the vendor said.

Other features include line or character insertion and deletion; a field protection designation; a clear-to-end-of-paper or line format; and a clear format for unprotected foreground data.

The Midas-52 costs \$1,995, Mini-Computer Systems said from 2259 Via Burton, Anaheim, Calif. 92806.

### Data Links Clock-Synchronized

NEW YORK — Domestic wideband data links can be clock-synchronized to lower speed data links from overseas by using Com Tech Systems, Inc.'s latest clock synchronizing unit.

The CLK/CON reportedly permits a 50K- or 56K bit/sec tandem link to be slaved to a lower speed 48K- or 50K bit/sec overseas link. The unit supplies the external high-speed clock needed to synchronize with the overseas link clock.

Internal patching shows the rate selections made, and the \$3,500 CLK/CON meets Bell 303 and CCITT V.35 specifications.

Four interface connectors are provided, one for each modem and two for the rate equalizing device at the tandem interface, Com Tech said from 15 William St., New York, N.Y. 10005.

## DG Minis Get Terminals For Remote Diagnostics

WESTBORO, Mass. — With the two latest additions to Data General Corp.'s Dasher line of CRT terminals, users of DG's Commercial Systems (CS) family can reportedly resolve hardware and software problems remotely from any telephone.

Aimed at corporate DP staffs and OEMs, the Dasher D4 user and Dasher D5 support center CRT terminals are integrated video/-communications subsystems that provide for alternate data and voice communications over the same direct-dial telephone line. DG claimed the terminals are the first of their kind able to reduce the labor and transportation costs of supporting users while enhancing support service.

Information displayed on one of the diagnostic Dashers simultaneously appears on the other, whether it is located across the country or across the street, a DG spokesman said. This allows support personnel to recommend solutions to application or system-level problems or actually perform corrective measures themselves.

Working in tandem, the D4 and D5 perform functions that a few years ago would have required "at least two dedicated telephone lines — one for voice and one for data communications — as well as complex software and a pair of communications processors," according to the spokesman.

With the terminals, system engineers, application programmers or systems analysts do not need to visit the user's computer site as often, the spokesman maintained.

The D4 and D5 are reportedly similar in appearance to other Dashers and have the

same removable and expanded keyboard featured by the Dasher D3. The D5 support terminal has an external tabletop communications controller, while the D4 user terminal has an integral communications controller, the spokesman added.

### Facilitating Troubleshooting

Working together, both terminals form a simultaneous voice and data communications link that includes a full-duplex modem featuring split transmission rates at both ends to facilitate remote troubleshooting, the spokesman said.

The D4 user CRT transmits data to the D5 support unit at 2,400 bit/sec, while the latter transmits information interactively to the user site at 150 bit/sec.

When not used in a diagnostic mode, these terminals can also serve as system consoles or as application terminals on any DG CS/30, CS/40 or CS/60 small business computer system ports.

The Dasher 4 user diagnostic CRT, also designated the DG Model 6120, costs \$4,500 with detachable keyboard, handset, 25 ft of cable and telephone line connector. The Dasher D5 support center diagnostic CRT, cataloged as Model 6121, carries a price tag of \$6,500 with detachable keyboard, external communications controller, handset, 25 ft of cable and telephone line connector.

The units are approved by the Federal Communications Commission and require no modem or Bell Data Access Arrangement, DG said from Rt. 9, Westboro, Mass. 01581.

## Terminal Built for DDP Users

WILMINGTON, Mass. — Compugraphic Corp. has presented distributed data processing (DDP) users with an intelligent terminal featuring up to 2M bytes of floppy disk-based mass storage and 48K bytes of internal memory.

In addition to DDP applications, the MDT-405 is intended for use in source data acquisition, remote text processing and stand-alone tasks.

The self-contained Intel Corp. 8085 microprocessor-based terminal includes a 9-in. CRT, a disk controller and serial ports in a bus-oriented, direct memory addressing environment. The display is scrollable through

a 2,560-char. buffer containing 32 lines of 80 characters each, Compugraphic said.

A special key allows instant display of any portion of the screen buffer and quick positioning of the cursor, the vendor added.

The unit's 128-char. Ascii keyboard allows field management and screen editing through single keystrokes. It has 178 user-defined keys that the operator can use for instant recall of fixed and variable data storage.

Dual-density floppy disks with 1M byte of random-access memory (RAM) are standard on the terminal, and two more

(Continued on Page 24)

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~multiplexers~

## Data Briefs

### Eight More Cities To Sell IBM 6670

FRANKLIN LAKES, N.J. — IBM's 6670 Information Distributor, which prints with a laser and transmits documents electronically over telephone lines, will be marketed by the Office Products Division (OPD) in eight additional cities.

The product will now be sold from Atlanta; Dallas; Hartford, Conn.; Houston; Washington, D.C.; San Francisco; and San Jose and Sacramento, Calif. Since its introduction in February, the 6670 has been marketed, shipped and installed only in New York City, Chicago and Los Angeles.

OPD is on Parson's Pond Drive, Franklin Lakes, N.J. 07417.

### ICA to Code Cards

NEW YORK — The Interbank Card Association (ICA) has announced that all Interbank cards issued by its member financial institutions after July 1 will bear a magnetic stripe encoded to ICA specifications.

The Master Charge card and other bank cards used in some 120 nations of the world are affected by the announcement, which was attributed to an increase in the number of point-of-sale terminals and automated teller machines used by ICA affiliates. The number is expected to grow.

The Interbank stripe will comply with standards No. 3554 and No. 2894 of the International Standards Organization, ICA said. However, the use of an encoded personal identification number on the stripe will remain optional.

## Transatlantic Link Unites Two Networks

WELLESLEY HILLS, Mass. — Prime Computer, Inc. has opened the first transatlantic data communications link to use both the British Post Office International Packet Switching Service (IPSS) and the U.S. Telenet Communications Corp. network.

This is the first time host computer systems on opposite sides of the Atlantic have communicated in this fashion,

a Prime spokesman said.

The link employs the Primeret communications software to join the vendor's research and development center in Bedford, England, with corporate network facilities in eastern Massachusetts.

Supporting X.25 protocols, Primeret allows computer systems in Bedford to access files stored in any of the 21 sys-

tems Prime maintains in the Boston area, the spokesman explained.

The corporate network is reportedly used to process Prime's business and engineering tasks and to regularly test and improve Primeret-associated products.

The mini vendor began processing its business data on the network in March 1977.

## Test Sets, Printer, Selector Switch Released

LINCOLN, R.I. — International Data Sciences, Inc. (IDS) has announced two test sets, a test set printer and a selector switch for data communications users.

The Hawk 4010 Datatrap is designed to monitor, generate and receive data at the modem-terminal interface. All data traffic is displayed on a 5-in., 512-char. CRT.

Interactive and monitoring capabilities are accessible through menu pages that display the status of an instrument configuration, thus guiding the user through fault analysis procedures, IDS stated.

The operator can program the Hawk to trap and store 4,096 characters and recall this data for further detailed visual analysis, the vendor added. The Hawk functions under Bisynch, Synchronous Data Link Control, High-Level Data Link Control and other asynchronous and synchronous protocols.

Transmission speeds reportedly range from 50- to 19,200 bit/sec using Ascii, Ebcidic, Hex, Octal, IBM Selectric, Ibars, Baudot and Transcode as standard formats. The RS-232C-compatible Hawk 4010 costs \$7,500.

IDS' less expensive 20910 data test set is a modular, general-purpose test set suited to asynchronous and synchronous communications up to 2,400 bit/sec and 20,000 bit/sec, respectively.

The 20910 features a transmitter, receiver, error counter and various interface modules. The \$4,900 unit provides a three-digit display of the bit error rate and interfaces all RS-232C modems, IDS said.

All controls are implemented by means of push-button switches, only one of which may be depressed at any one time.

### Printer Provides Copy

Joining the 20910 as an addition to IDS' Range Rider line

of communications test equipment is the 2900D data test set printer, designed to operate with the vendor's Model 3000D high-speed, synchronous test set and provide a hard-copy record of RS-232C, V.35, Bell 301/303, RS-422 or Mil 188 interface test results.

The 2900D records errored seconds, total seconds, errored bits and total bits tallied by the four-event counters in the Model 3000D. A preset, 24-hour real-time clock records the time each printout is made in hours and minutes.

The \$4,355 printer can also record occurrences of "sync lost" and "sync recovered" conditions, IDS said.

Finally, IDS has introduced the Model 8907 48-pole A,B

selector switch, which provides single-channel A,B switching functions for communications interfaces using up to 48 lines per channel.

The 8907 runs with the vendor's 8964 controller and power module. Both units are contained by the Model 8903 cage assembly, which in turn mounts in the standard 19-in. cabinet of a technical control center, IDS noted.

A master A,B switch on the 8964 can perform bulk switching of eight 8907 modules.

Magnetic latching relays protect the \$505 selector switch from power failures and line transients, IDS said from 7 Wellington Road, Lincoln, R.I. 02865.

### Unveils CCITT Unit

## ARC Upgrades Protocol Tester

ALEXANDRIA, Va. — Atlantic Research Corp. (ARC) has unveiled what it called a more powerful and flexible version of its protocol tester and a CCITT interface tester that can double as a modem eliminator.

The Model J version of the Intershake II test system is said to provide an instruction set expanded 25% over the older programmable tester. The increase should enhance the power and speed of its programming, according to ARC.

The portable tester now al-

lows "truly interactive testing" of the International Programmed Airline Reservation System (Ipars), X.25 Levels 1 through 4, IBM's Systems Network Architecture (SNA), packet networks, IBM 3270, 3275 and 3276 terminals, Teletype Corp.'s 4540 terminal and transparent bisynch, including protocol simulation and real-time calculation of cyclic redundancy check (CRC), ARC said.

The Model J can perform statistical network performance analysis of statistical data, timing data, throughput

and line utilization data.

A library of programs simplifies operations by unskilled personnel, "virtually automating the testing of the data network," ARC stated.

The Model J can perform measurements at data rates from 56K- to 230K bit/sec. An editor, described by the vendor as "powerful," is used for program development, and the tester is said to be compatible with "virtually" any line protocol.

The Model J costs \$9,950. A complete system consists of a typewriter-style keyboard costing \$1,450 and a CRT that plugs into the Model J and costs \$3,300. The CRT can be ordered separately as a stand-alone monitor for \$4,900, ARC said.

The vendor's Model IFT-680 V.35 interface tester is a combination breakout box and interface analyzer designed for testing the CCITT V.35 modem and terminal interface.

The portable tester is said to give the user access to and allow transparent analysis of the V.35 interface. Dual red and green LED indicators show the status of each interchange circuit, and color-coded test points reduce patching errors, improving identification of various interface levels, ARC indicated.

The IFT-680 costs \$1,175 from ARC, 5390 Cherokee Ave., Alexandria, Va. 22314.

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## Intelligent Terminal Has 48K Bytes of Memory

(Continued from Page 23) drives with an additional 1M byte of RAM are available.

The MDT-405 can communicate with host computers or other terminals using asynchronous or binary synchronous modes at speeds up to 9,600 bit/sec. Interactive, batch and print communications are provided through software control.

### Operating System Support

The terminal is supported by a multidisk operating system for editing functions and file maintenance. It is user-programmable either in Basic via the keyboard or in assembler,

PL/M or Fortran using Intel's MDS-230 or any standard microprocessor development tool, Compugraphic said.

A typical system with 16K bytes of RAM costs \$6,925. Adding the optional 1M byte of floppy disk memory brings the price to \$9,550.

Memory expansion to 48K bytes is available in 16K increments. Other options include dual serial interfaces, hard-copy printers, applications packages and additional character sets.

Compugraphic is at 80 Industrial Way, Wilmington, Mass. 01887.



# Through Short-Distance Design Line Drivers Immunize Hospital Against Waste

By Thomas Galleo

Special to CW

CHAPEL HILL, N.C. — Hospitals, by their very nature, generate immense quantities of information that must be stored and kept readily available for use by doctors, nurses, administrators and others. Hospitals have therefore always been among the leaders in the installation of, computerized records management systems.

At North Carolina Memorial Hospital, for example, a 650-bed operation, we have an average occupancy rate of 90%. As a result, more than 450,000 individual records have accumulated in our central patient master file over the years. This file now resides in the central data base of our Honeywell, Inc. 6660 system.

In addition to patient information, a hospital has many other DP requirements. For example, purchasing and inventory data must be available so managers can determine required inventory levels and optimal reorder points for cost control purposes.

This data, along with such information as admission and discharge activity, clinic appointments, bed status, accounts payable, accounts receivable, patient billing and pharmacy unit dosages, is also maintained within our central data base.

An extensive security system ensures that only authorized personnel can retrieve, enter, delete, update or review this sensitive information.

## Seventy-Six Terminals

We presently have 76 on-line terminals located in appropriate areas throughout the hospital to afford access to this data. These are linked to the central computer by the same types of hard-wired metallic circuits that provide voice-frequency channels for intrahospital telephone conversations.

With the exception of a remote financial center, which is approximately one and a half miles away, no terminal is more than 1,000 feet from the computer.

The information exchanged by the terminals and computer is, of course, binary in nature. The voice-frequency channels, however, cannot support the on-and-off voltage pattern that represents the data, so the binary processing language must be translated into an analog voice communications language before it can be transmitted.

When the hospital's computer network was originally installed, Western Electric Co. 201C modems were leased and used to perform the translation. One modem was installed at each remote terminal location and at the computer end of each channel to accept digital data and produce a modulated continuous-wave signal that could be transmitted over the facility.

## Cost-Effectiveness Problems

Because the greatest distance involved is approximately one and a half miles, however, and although it was paid for, the full capability of these modems could not be used. Designers and users of limited-distance data communications networks often face the problem, which is a direct result of the direction modem development has taken.

Modem manufacturers have gener-

ally sought to increase the data capacity and extend the operating range of their products. This has resulted in the proliferation of equipment well-suited to high-speed, long-haul applications. It has also meant that, in short-haul situations, the full capabilities of these units cannot be exploited.

The problem, then, is one of cost-effectiveness; the user is faced with paying for capabilities he cannot employ in his system.

The solution to the problem, of course, is a modem intended only for this type of application. Prentice Corp.'s Synchronous Line Drivers (SLD), with which we have now replaced our leased 201Cs, has proven ideally suited to our needs.

Designed specifically for use on limited-distance, private-line metallic circuits, the SLD is, in fact, a synchronous short-haul modem that uses a phase-encoded modulation technique.

## Full-Duplex Operation

In our network, the central computer can address rack-mounted SLDs through a communications interface. These SLDs are connected by metallic four-wire private lines to stand-alone units at the remote terminal sites.

This configuration provides the full-duplex operation we need, although we could as easily have used a two- or four-wire half-duplex mode if desired.

When we installed the line drivers, we found there was no need for meters, oscilloscopes, bit error rate testers, adjustments or manufacturer's service personnel. The system now operates at 4,800 bit/sec, but the rate can be changed, if the need arises, by simply resetting a switch on each unit.

Of particular importance to us, because immediate access to data is required at all times, is the fact that each SLD unit contains complete built-in diagnostic capabilities, including local and remote loop-back and self-test. This greatly simplifies fault isolation and speeds maintenance.

## Plug-In Replacement

In addition, because all the Prentice equipment is modular, the source of a problem can be determined quickly and, if necessary, a replacement unit simply plugged in. Although we maintain a 10% spares level, the SLDs have been so reliable during the year since they were installed that this spares level has never really proved necessary.

Expense was the main consideration in the replacement of our underused leased modems with the 152 SLDs. With the outright purchase of the Prentice units, we have dramatically decreased our long-term equipment investment without sacrificing transmission quality or system flexibility.

The SLDs, in fact, paid for themselves in approximately nine months when compared with the ongoing rental for our 201C modems.

Because we are a publicly financed institution, we must constantly be searching for ways to control costs without degrading the level of our service. One of the ways we have found to do this in our hospital information and records management system is through the purchase and use of short-haul modems whose full capabilities

can be exploited.

The resulting decrease in overall DP expenses has proved to be significant and has allowed us to continue developing and improving our facility to better support administrative, finan-

cial and — most important — patient care functions.

Galleo is director of management systems and data processing at North Carolina Memorial Hospital in Chapel Hill, N.C.

# Voice Input Unit Operates Over Standard Telephone

BELMONT, Mass. — The Model 1800 voice input terminal from Dialog Systems, Inc. reportedly allows authorized users to input data and communicate with an attached mainframe standard telephone. The system then responds appropriately with spoken output.

The unit, which can accommodate up to eight users simultaneously, is "speaker-independent"; the person using it need not train the system to recognize his voice, nor must he be a DPer, according to a company spokesman.

## Graphics Unit Gets Perspective

NASHUA, N.H. — A three-dimensional option with a perspective projection feature intended for use with the Graphic 7 intelligent display terminal is available from Sanders Associates, Inc.

The Model 5753 Coordinate Converter Option plugs into the Graphic 7 and permits dynamic manipulation of objects in space. The perspective feature is said to be useful because the location of the viewer is defined in relation to the image space.

Three-dimensional windowing, in conjunction with independent screen coordinate mapping, allows the presentation of any data within a software-definable image space to be presented on the full screen or any portion of the screen, Sanders explained.

The 5753 is priced at \$9,600 from Sanders Associates, Daniel Webster Highway, Nashua, N.H. 03061.

Suggested uses for the system include order entry, credit card verification and inventory inquiries. The unit is also recommended for people such as on-the-road salespeople who do not or cannot take specialized terminals with them.

## Accommodating Rotary Dials

Although Touch-Tone telephones or pads are often used for this type of application, the spokesman said that most of the telephones in the U.S. are conventional rotary-dial phones. It is this difficulty the company is attempting to address.

The unit is available in several models, beginning with an input-only unit that can recognize 21 words, including 10 digits and command words. Optional recognition words can be added at additional cost, the spokesman stated.

The response vocabulary consists of approximately 128 words, providing up to 64 sec of speech. The voice response of all systems can be tailored to single words or short sentences as required and is expandable up to approximately 256 words.

The Model 1800 can interface to a standard RS-232 asynchronous, full-duplex line at speeds up to 4,800 bit/sec or to a 20mA interface. In addition, it can emulate standard computer interfaces such as the IBM 3271 or operate off-line with magnetic storage media.

Prices run from approximately \$60,000 to \$100,000, depending on the options chosen and their complexity, the spokesman said from Dialog Systems, 32 Locust St., Belmont, Mass. 02178.

He split his own britches,  
but he had another pair!

## Got a back-up computer facility?

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## IBM Users Offered Multifunction Terminal

CUPERTINO, Calif. — A multi function terminal that attaches to IBM's 360, 370 and 30 series processors and compatible mainframes is available from Braegen Corp.

The Multitask Terminal System uses a programmable B-40 computer-based controller, Braegen CRT terminals and other peripherals selected according to the users' requirements.

The terminal can appear to the host CPU as an IBM 3270 local or remote subsystem; an IBM 3780 terminal; a local job entry system consisting of an IBM 2821 plus 1403 printer and a 2501 card reader; or as any combination of these machines, according to Braegen.

Other features reportedly include:

- Address switching by which any Braegen CRT terminal can have up to 16 different local and remote addresses for various applications.
- Local job entry using 1,200 line/min printers with 1,403 addresses and card readers with 2,501 addresses attachable to any Braegen CRT terminal.
- Daisy-chained CRT terminals that eliminate the need for separate coaxial cables for each CRT terminal.

A typical Multitask Terminal System costs \$50,000. It can be leased for \$2,000/mo, Braegen said from 20740 Valley Green Drive, Cupertino, Calif. 95014.

## Self-Service Bank Terminal Introduced by Burroughs

DETROIT — Burroughs Corp. has introduced a stand-alone, half-duplex terminal that allows bank customers to do their banking without waiting in line for teller windows to become available.

The RT600 terminal handles deposits and withdrawals, cashes checks, transfers funds between accounts, determines account balances and conducts other basic transactions. It reads the user's magnetic-striped identification card through either a manually operated or automatic card reader.

A Touch-Tone-style keyboard with yes, no and cancel keys and a 15-line, 40-char. 9-in. CRT facilitate communication. The system prompts the customer through the transaction, Burroughs said.

The RT600's cash dispenser

holds a maximum of 1,300 bills in each of two denominations. A 90 char./sec printer generates a customer receipt in four seconds, the company indicated.

### Choice of Interface

Other features include a choice of asynchronous or synchronous interfaces with 75- to 1,800 bit/sec or 2,400 bit/sec transmission speeds, respectively.

Users can run the RT600 under Burroughs Poll/Select or IBM 3270 procedures, the company added.

The RT600 can be purchased for \$17,400 or leased for \$727/mo. Systems software and necessary application program products may be licensed for a one-time payment of \$500 or for \$18/mo.

## Two for Editing, One With Micro Intertec Brings Out Smart CRTs

COLUMBIA, S.C. — Three intelligent CRT terminals — two of them oriented toward editing and the third featuring a 64K-byte microcomputer — are available from Intertec Data Systems, Inc.

The editing Intertube II offers an Ascii keyboard with an 18-key numeric pad, 14 user-definable function keys, an 8

by 10 dot matrix and a 1,920-char. screen.

The terminal includes character and line insert/delete, full and/or partial block transmit modes, programmable end-of-line terminators and self-test mode for maintenance.

The Intertube II has an RS-232C interface and printer

part that operate in the 50- to 9,600 bit/sec range, the company said. The terminal costs \$995.

### Editing Terminal

The Amoeba text editing terminal features a digital micro-cassette that stores up to 60K bytes of information. The unit, with 16K bytes of internal random-access memory (RAM), can be programmed in Amoeba's version of Basic, which reportedly allows emulation of other terminal systems.

The Amoeba has a 2,000-char., 12-in. CRT with an 8 by 8 character matrix. Its 62-key keyboard includes a numeric pad with decimal point, comma, minus and four function keys that generate all 128 upper and lower register Ascii characters.

The unit has a refresh rate of 60 frame/sec. Half-duplex or full-duplex operation is keyboard selectable, and the unit uses an RS-232C interface for a serial transmission rate of up to 9,600 bit/sec.

The Amoeba costs \$1,495.

### 'Superbrain' Suits Business

Intertec's Superbrain is billed as a microcomputer system designed for small business systems applications. Standard features include two double-density 5.25-in. floppy disk drives with 320K bytes of storage built into the front of the terminal; 48K bytes of programmable RAM, expandable to 64K bytes; and a CP/M disk-based operating system with text editor, an assembler and a debugger.

An S-100 bus adapter permits connection of auxiliary peripherals to the system. The twin microprocessors allow efficient data transfer between the 12-in. CRT and the peripherals, according to the vendor.

Superbrain is priced at \$2,995 from Intertec Data Systems, 2300 Broad River Road, Columbia, S.C. 29210.

## Communications Front End Built to Work With Nova

ELMSFORD, N.Y. — A microprocessor-based traffic processor that interfaces with Data General Corp.'s Nova minicomputer is available from Mini-Computer Systems, Inc. (MCS).

The Micros Asynchronous Communications Controller (Macc) was designed to help the Nova process a large volume of character traffic to and from on-line terminals, MCS said.

The unit acts as a terminal front-end processor to perform all character-by-character processing formerly done by the CPU. This includes forward and backward spacing, line deletion and es-

cape, character echoing and character parity checking.

Each controller occupies a single card position in the system chassis and includes 2K bytes of read-only memory and 2K bytes of random-access memory.

The unit has an I/O bus interface and eight asynchronous line interfaces.

Operating system software is incorporated on the board and provides terminal control, including character-level control and full modulator-demodulator controls, the vendor said.

The Macc costs \$7,500. MCS is located at 399 Farview Park Drive, Elmsford, N.Y. 10525.

## Intelligent Line Adapter Designed for Memorex 1270

SANTA CLARA, Calif. — Users of Memorex Corp.'s 1270 terminal control unit can now take advantage of the first of a number of Intelligent Line Adapter (ILA) enhancements for that unit.

The initial ILA-based feature, available from Memorex in the fourth quarter, is the High Speed Asynchronous Line Adapter. It allows the 1270 to support low-cost asynchronous Ascii CRT ter-

minals at switch-selectable speeds up to 9,600 bit/sec, without requiring synchronous clocking modems or other clocking devices such as modem eliminators, according to a spokesman.

IBM 3704 and 3705 communications controllers do not offer this type of feature, Memorex stated. Prices for the feature, which supports up to four lines, is \$100/mo on a lease basis or \$3,600 to purchase.

Memorex plans to offer further enhancements that "will eventually provide the 1270 with even more capabilities beyond those normally associated with hard-wired controllers," the spokesman said.

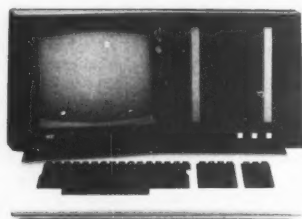
Memorex also announced the availability of Sabre code and Swift Network support for the 1270. Sabre code support allows the attachment of up to 48 full-duplex lines for connection to the IBM 1006 Terminal Interchange.

Sabre can be leased for \$500/mo or purchased for \$18,000, plus \$65/mo for each full-duplex line, or \$2,340 if purchased.

The Swift feature can be leased for \$35/mo or bought for \$850, regardless of the number of lines.

Memorex is located at San Tomas at Central Expressway, Santa Clara, Calif. 95052.

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## Newspapers Covering News When, Where It Happens With 'Electronic Copyboys'

Special to CW

While pencils and notebooks are standard fixtures in the journalistic trade, portable terminals are fast replacing typewriters as reporting tools.

Previously used solely for remote news-gathering chores, "electronic copyboys" are now used wherever the action is — in a sports stadium, at legislative sessions, in police stations or at grand openings. Reporters just plug in the terminals and type stories as they happen.

The units provide a hard-copy print-out for on-the-spot reference and editing, and at least one model offers a nonvolatile bubble memory to store material before it is transmitted back to the newsroom.

"After a short training session, when our reporters write their first stories on [terminals], you can't pry them out of their hands," according to Dick Klein, managing editor of the *Des Moines Register and Tribune*. Klein's newspaper has a number of Texas Instruments, Inc. Model 765 terminals both at its home office and at its Washington, D.C., bureau.

"We need them to keep up-to-date on what is going on in Washington," Klein said. "They are especially useful in the Legislature. The reporter can go right to work in the session and the Capitol building without disturbing anyone."

### A Crowd-Pleaser

Jim Marchant, assistant for newsroom technological development at the *Des Moines daily*, claims the biggest problem with the Model 765 is the crowd it draws. "Our farm and agricultural writer was at Iowa State when the recent [solar] eclipse was taking place. The 765 was drawing more of a crowd than the eclipse."

Reporters are always swamped with people who want to see how the terminal works and what it can do, he said, and that generates a lot of calls to the office — especially from other newspapers interested in the machines.

With a terminal, a reporter can also work at home, Klein observed. After covering a story, the current events columnist for the *Register and Tribune* would have to drive downtown at odd hours of the day and night to file a story with her editor. Now her husband can pick up the 765 on his way home and she can file her story from there.

Taking the terminal's use a step further, the *Register and Tribune* has established a "mini wire service" that empties each reporter's work into a central data base. Writers can hold two stories in the 765's bubble memory at the same time, and each or both of them can be transferred to the newspaper's computer.

Later, they can be selected and inserted into the earliest possible news edition, Klein pointed out.

### From New York to Dallas

Recently, a *Dallas Morning News* reporter used a TI 765 on a trip he made to New York to cover the opening of the first 7-Eleven food store in Manhattan. "From 10 a.m. to 2 p.m. Thurs-

day, I was covering the story," business writer Tom Bayer recalled. "There was a lot of color to soak up, because I wanted to show the contrast between a storefront 7-Eleven in Manhattan and the kind you drive up to in Dallas."

Bayer returned to his hotel room about 3:30 p.m. and put the finishing touches on his story by 5:30, when the telephone rang. "It was my copy editor, whose message was, 'File, right now. File.' I didn't have a chance to read and edit it, but . . . even though the operator cut me off several times, my story was in Dallas, filed in my editor's work queue within 15 minutes of the time he called."

The story appeared in the *Dallas Morning News* the next day.

### Over the Border

At the *Houston Chronicle*, two reporters that recently followed Pope John Paul II and President Jimmy Carter on separate trips to Mexico had a chance to use TI's terminal over international telephone lines.

"After we covered our stories, we went to the pressroom the Mexican government had provided. We typed and edited our stories on-site, then used the phone to call in our stories," one of those reporters said.

Both *Chronicle* reporters took advantage of the 765's bubble memory, which can store up to 20,000 characters — four to five typewritten pages — and can optionally hold 16 to 20 pages.

"We both had reservations about using the international phone system, but with the bubble memory there was no chance of losing a story," the writer commented.

The switch from typewriters to terminals in the newsroom is not limited to U.S. publications. At the Swedish newspaper *Dagens Nyheter*, TI 765s help reporters gather the news faster, and their use has reduced the paper's communications costs, according to Managing Editor Olof Bergman.

Before the daily began using terminals, reporters had to turn in their articles several hours before the paper went to press. A reporter at the scene of a news event telephoned his story into a tape recorder at the editor's office, and the recorded message was transposed and edited, typed and sent to the typesetting department.

"Today, that same reporter types and edits his article at the scene and sends it directly to the editor," Bergman said.

## Instruments Get Link To RS-232C, IEEE-488

SAN DIEGO — Datacap, Inc.'s Instrumate is an interface that reportedly converts the digital output of instruments to signals compatible with standard recording devices or terminals.

The RS-232C- and IEEE-488-compatible Instru-Mate can automatically cycle digital instruments as a "low-cost" data logging system, Datacap maintained. With a self-contained power supply, the unit costs \$750 or, in OEM quantities, as low as \$490.

Datacap is at Building 5, 11558 Sorrento Valley Road, San Diego, Calif. 92121.

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## CRT Has Two-Page Memory

SALT LAKE CITY, Utah — A terminal featuring two pages of display memory scrolling and page controls is available from Beehive International.

With a detachable alphanumeric keyboard, the DM30 terminal has a 24-line by 80-character screen and a 25th line for display of status and error messages.

Editing and formatting facilities are provided, including selectable entry parameters for alphanumeric, total fill, must fill, constant and modified modes.

Twenty-one combinations of visual attributes are provided through non-space consuming codes, the company said.

Communications facilities via the

serial asynchronous RS-232C main and auxiliary ports are speed-selectable through system software or through switches at up to 19.2K bit/sec. Data can be passed between ports at differing speeds at the same time an operator is using the DM30 for data entry, the company noted.

Standard communications facilities of the unit include conversational, line, page, block or message codes. A Centronics Data Computer Corp. plug-compatible parallel printer interface is standard, Beehive said.

The DM30 costs \$1,995, Beehive said from 4910 Amelia Earhart Drive, Box 2568, Salt Lake City, Utah 84125.

## Necis Serial Impact Printer Suits Remote Applications

LEXINGTON, Mass. — A micro-processor-controlled serial impact printer for remote printing applications requiring high-quality printout has been added to NEC Information Systems, Inc.'s (Necis) family of Spinwriter printers.

Necis also introduced five character fonts for the Spinwriter systems, including a font that reportedly meets all Ansi OCR-B character requirements for optical character recognition (OCR) systems document preparation.

The Model 5540 keyboard send/receive (KSR) APL printer prints 55 char./sec and can receive data at rates up to 120 char./sec via an RS-232C or CCITT V.24 interface. A buffer stores

256 characters of incoming data.

The terminal is switch- or program-selectable between APL and Ascii modes and comes with a print thimble font with both modes' symbols, the company indicated. An indicator light shows when the 5540 is operating in the APL mode.

The 5540 can plot 5,760 points per sq in. and is controlled by external software to the printer, the company indicated.

A variety of friction feeds are available on the 5540.

New to the Spinwriter printer systems are four convenience features of the 5540. Tab stops are automatically set within the terminal in every eighth column, which is the standard spacing for APL users, Necis said.

An audible, user-adjustable alarm can be set for individual working environments. Program control allows tabs to be relocated under a single escape code sequence so the automatic eight-column setting can be changed by specifying the desired column tab spacing. The terminal will calculate and relocate the whole line of tabs automatically.

All keys are engraved on top with both APL and Ascii characters so operators can more easily move from one mode to the other.

The 5540 can reportedly print an original and six copies. Its keyboard consists of a 47-key typewriter-style keyboard, four operator function keys and a 15-key numeric keypad.

As with all Spinwriter models, the 5540 uses a small-diameter, low-mass thimble-shaped print element. It costs \$3,300 and is available in 60 to 90 days, Necis said from 5 Militia Drive, Lexington, Mass. 02173.

## Information Control Brings Out Light Pens

LOS ANGELES — Information Control Corp. has released a series of lightpens for use with CRT terminals. Typical applications include symbol sensing, editing, graphics and integrated circuit masking.

The LP-700 series reportedly features self-contained, solid-state electronics within the body of the lightpen and employs a single-voltage (+5V) power supply. Light and activation output signals are compatible with transistor-to-transistor logic, a vendor spokesman added.

With an adjustable luminous sensitivity of 1 ft-lumen and a 300 nsec response time, the pens cost \$142 each in quantities of 100. Information Control said from 9610 Bellanca Ave., Los Angeles, Calif. 90045.

## For today's business, word processing alone isn't enough.

### The Jacquard Videocomputer is.

From small businesses to large departmental staffs, users have come to recognize the Jacquard Videocomputer as the total information system for the automated office.

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## When It Comes to Flooded Sites . . . Univac CEs Wield a Mean Hair Dryer

**Special to CW**  
CENTEREACH, N.Y. — Fans, hair dryers, an extra CPU and dedicated action by several customer engineers combined to save the day for a bank here that suffered a flooded computer room last February.

An intense cold spell caused a pipe to burst on the second floor of the Suffolk County Federal Savings Bank here. After inundating the banking floor below, the water began pouring into the basement computer room, which housed a Univac 90/60 system.

"Niagara Falls would be a good illustration of what it looked like when I walked in," recalled Augustus Weaver, the bank's senior vice-president for DP. "Even as I walked in at 3 a.m., the water was cascading down the walls. It caused our CO<sub>2</sub> fire detection system to trip off, which resulted in an extreme temperature change because of the hot water coming in and the [cold] CO<sub>2</sub>."

Vern Geckler, the branch manager for the local Univac support office arrived on the scene sometime afterward. He echoed Weaver's remarks: "The first thing I saw was a disaster. The whole floor was soaking wet, even out in the halls 40 or 60 feet away from the computer room."

"The rugs and ceilings were soaked, there were hair dryers and fans going all around and people with mops," he said.

### Diverted Hardware

One of Weaver's first concerns was the bank's on-line system. Nineteen branches are linked to headquarters via terminals used for savings, loan payments and other banking applications, and considerable water damage had been suffered by the CPU, memory and two Univac disk drives.

Fortunately for Weaver, a Univac 90/60 processor, input/output control and a power control were awaiting installation at the Computer Health Service in nearby Huntington. Geckler hired a moving company on an emergency basis to ship the hardware to the bank, then began making frantic phone calls to obtain a badly needed Model 7035 512K-byte memory cabinet and

two new disk units.

If that hardware had not been available, Geckler said, he was ready to have a mainframe air-shipped from Univac's Roseville, Minn. facility.

At the same time Geckler was arranging for the replacement CPU, his customer engineers (CE) were pitching in to remove the waterlogged ceiling tiles, mop up the water and perform the other tasks that were necessary before they could actually begin their work. "I can't say enough about the CEs — they did a bang-up job. Those guys are dedicated people; we get along quite well with them, and we've been a long-time user of Univac hardware," Weaver said.

"We treat them well and they

treat us well — that's the only way I can explain it. They are dedicated men, and we didn't pay anything extra for this service beyond the extra hours [specified in the maintenance contract]."

### Blown-Dry Disks

The CEs disconnected the mainframe, a damaged Model 1005 card reader and the two damaged disk drives in preparation for installing replacements. When it became evident that the new memory unit and disk drives would not be available when needed, the CEs disassembled these units, repaired them, dried them with hair dryers and reassembled them.

Shortly after the water stopped pouring in, offers of help started

pouring in from other Univac users nearby, such as Central Federation Savings Bank and the Interstate Drug Co., which provided time on their systems to help keep the more critical bank reports up to date.

When the banking floor opened — on time — later that morning, customers were served in the lobby. Banking data was recorded on floppy disks or with paper tape capabilities of the teller terminals.

The only functions that tellers could not perform were inquiries on account status, but even in these cases the bank had a backup — printed reports of the most recently recorded account status. Fortunately, there was

(Continued on Page 31)

## Pricing Errors Go Up in Smoke With One-Step Invoicing System

**Special to CW**

TULSA, Okla. — Because of the enormous amount of merchandise handled and the large number of orders processed, the tobacco industry is a natural for the invoicing and sales reporting capabilities of an advanced data entry system.

"The tobacco business is extremely competitive. We work on a profit structure that you wouldn't believe — you simply wouldn't think we could exist on it. But it's the volume of business we do that makes the whole thing go together," Paul Adkins, manager of the Tulsa Tobacco Co. here, said.

Tulsa Tobacco's business today is 60% tobacco and smoking brands, 10% cigars, 20% candy and the remainder in smoking and miscellaneous articles. The firm's 3,000 products go to almost 1,000 customers ranging from small cigar stands to large chain stores.

Although the firm presently has a Sycor, Inc. 440 minicomputer, computerization began in 1976 when a Denver software company designed and installed a billing system in the Pueblo, Colo., division — Corkish-Flaks

Cigar Co.

"Corkish-Flaks sold to a lot of convenience-type stores, which is an extremely fast business, so they needed something to carry out accurate, speedy billing," Adkins said. "Their original at-

tempt to computerize resulted in a system which continually malfunctioned, so they changed to Sycor equipment."

The firm now has two more systems, in Denver and here in

(Continued on Page 30)

## Disk Cache System Added For Memorex 3650 Drives

SANTA CLARA, Calif. — Memorex Corp. has introduced a disk cache system for its 3650 disk drives. The concept, introduced last year for the company's 3670/3675 drives, allows users to access heavily used data more rapidly than a standard disk system.

The Memorex 3750 disk cache, which uses 1M to 12M bytes of solid-state memory, is said to be hardware- and software-compatible with all IBM 370/145 and larger processors and with compatible processors. However, it works only with Memorex drives, a spokesman noted.

The unit holds frequently used data in the cache so it can be transferred to the CPU at speeds close to that of the channel, he

claimed. This avoids latency and rotational delay.

Scheduled for delivery in the second quarter of 1980, the Model 3750 is operationally transparent to all time-independent user programs and is compatible with all IBM disk access methods and standard operating systems, the spokesman said.

Memorex drives already installed can be field-upgraded with the device. The additional cost for the 3750 over Memorex disks is \$80,000, whether ordered as original equipment or field-upgraded.

The unit costs \$2,195/mo on a two-year lease, Memorex said from San Tomas at Central Expressway, Santa Clara, Calif. 95052.

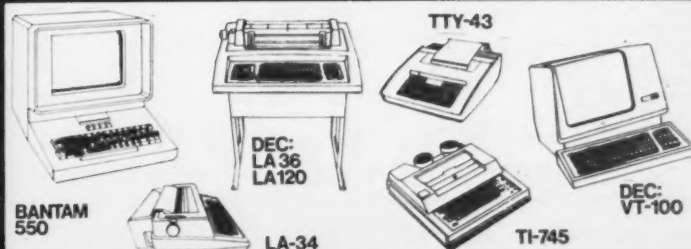
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# Tobacco Distributor Enjoys One-Step Invoicing

(Continued from Page 29)

Tulsa, and will eventually place similar computers in the majority of the other 16 branches.

Tulsa's computer room houses a Sycor 440 with two data stations and two printers.

## Order Handling

"Orders are received either by telephone or filled out by our salesmen on three types of major-order guides," technical advisor Joanna Baer, explained. "These sheets list items and quantity of our main product line."

A white order guide is literally an encyclopedia listing of every brand of candy and cigarettes, a green guide lists tobaccos and cigars and a yellow guide lists a large selection of lighters,

pipes, gloves and drug sundries, Baer said.

The orders are collected and taken into the warehouse where they are filled and the guide sheets marked accordingly.

After inventory picking is completed, the order guides are returned to the computer room, where the night crew keys in customer number, item number and quantity. The system then automatically generates three-part invoice forms. "At that point all the orders have been filled and all the customers have been invoiced for the items we have in stock," Baer stated.

## Busy Nights

According to Ron Jameson, manager of the Computer Department, the

company processes approximately 120 invoices per night in this manner within five or six hours. Each may vary in size from one entry, to five or six pages of items for the larger customers.

There are nine possible levels of discount, depending on item and size of customer. Because all this information is contained in the 440's memory, there is no chance of assigning an incorrect discount to a customer, or forgetting basic information, Jameson noted.

The operator keys in the date, invoice number and account number. The customer name, address, allowed discount information and salesmen are then instantly displayed on the screen or printed in hard copy. The system also calculates and prints cigar tax, ciga-

rette tax and paper tax as well as city, state and federal tax on each invoice.

## Price Changes

Price changes can be a significant thorn not only in Tulsa's business, but also in that of its customers. "The magnitude and frequency of changes in prices that come through here on a daily basis is so large, it's ridiculous," Adkins said. Such price changes are easily kept up-to-date in internal documentation by the computer.

"Before we received our present system," Baer noted, "we had to hand-type new lists of our constantly changing prices — and this cost us quite a bit of time. Now, the system's on-line editing feature allows us to key in new prices to the 440, update our data base of prices and automatically run off a printed price sheet — at any time."

Complete product price list pamphlets are now generated monthly for all salesmen and office people in a short time.

Sales reporting is an integral part of any fast-moving wholesale distribution operation. "We use the system to generate both daily and weekly sales reports," Jameson said. "They contain sales breakdowns by salesman and by item, with selling price, our cost, gross profit and percent gross profit indicated."

According to Adkins, these reports are not only valuable for projections, but are used by top management to appraise whether a territory is profitable and whether a salesman is earning too much or too little.

"In addition," Adkins noted, "the computer tells us at the end of each day how much money we should put in the bank, both from sales and from collections. And, that dollar amount has to be in the bank daily; otherwise we would have a significant cash flow problem."

## 'We'll Turn Handsprings'

Continued expansion is evident and, as Adkins sees it, is the direct result of satisfying customers. "We'll turn handsprings to provide a benefit for them. This is the way we've been able to keep our business — and it has paid off, because we've been very successful over the years."

Because of rapidly changing product prices, the retailer could suffer. As Adkins put it, "All that retailer has to do is keep selling at the same price for two months and he can't pay his bills, because he's lost money."

"We will soon be coming out with a program that will tell the retailer what his selling prices should be. We feel that this will be a definite plus in holding that customer because he doesn't have time to see every invoice and must have confidence in us."



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The word processing capability is just one of the many benefits you get with MDS Series 21 systems. There's modularity, for instance, that provides easy expansion or modification so you can grow at your own rate. A complete range of optional peripherals includes character and line

printers. Tape drives and additional disk storage give you complete freedom to configure Series 21 equipment for application needs at central or remote locations.

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## Amer-O-Matic Unveils Two Units OCR Readers Built for Big Installations

BIRMINGHAM, Ala. — Amer-O-Matic Corp. has introduced two optical character recognition (OCR) readers for large installations.

The OCR100 is a scanner that interfaces to an existing system to provide key entry, data display and data capture. The unit includes a complete reader with automatic document feed, one OCR read head, one numeric font, one document pocket, 8K bytes of firmware programmed by the vendor to user specifications and a communications interface.

The interface can be 20mA current-loop, RS-232C or IBM 3277 keyboard emulation, the firm stated.

The \$19,800 unit, which the company suggests for stable applications working in conjunction with an existing sys-

tem, can be augmented with the addition of 32K bytes and additional communications features, a spokesman said.

The OCR100's big sister, the OCR500, has all the features of the 100 as well as on- or off-line capabilities and extensive user programming options.

Programming is accomplished through an extended version of the standard Basic language called OCR Basic. Programs can be written by the user or by the vendor, the spokesman said and can be as small as the 5K bytes of user memory available with the system or as large as 34K, with the addition of 29K bytes of memory.

Other standard features of the OCR500 include a single line display; a full alphanumeric keyboard with 18 spe-



Amer-O-Matic OCR500

cial function keys and a separate numeric pad; and an industry-compatible floppy disk drive.

Options available on the \$25,200 OCR500 include up to six additional OCR fonts for \$1,100 each; a CRT for \$800; a \$900 printer operating at 30 char./sec with a line width of 132 characters; the additional user memory at \$80 per 2K bytes; an additional floppy drive and an additional tape drive (800- or 1,600 bit/in., 9-track).

Also available as extras are a tape feeder and selectable document stackers.

The company suggested two applications for the products: jobs requiring scanning but lacking adequate volume to justify a high-speed scanner; and jobs requiring key entry of information in addition to that contained on a document. The two units are particularly

suited for distributed processing users.

Additional information is available from Amer-O-Matic at 804 Fourth Ave. North, P.O. Box 2247, Birmingham, Ala. 35201.

### Reader Takes .04-In. Badges

MAMARONECK, N.Y. — A solid-state badge reader from Sealectro Corp. was designed to accept badges up to .04 in. thick.

Available without interfaces but compatible with all standard interfaces, the device uses parallel data entry in conjunction with a strobe light technique.

Extra sensors, designed to check for improper badge operation, are an integral feature of the unit, a spokesman noted.

### Reads Hollerith

The reader can read Hollerith-coded punched information on the badges, such as employee numbers, and is available for both credit card and ID-sized badges.

The device costs \$257 each, with OEM discounts available, the spokesman said from Sealectro, 225 Hoyt St., Mamaroneck, N.Y. 10543.

## Datapoint Packs Six ARCs Into 'Starter Kit' for DDP

SAN ANTONIO, Texas — Datapoint Corp. has introduced the Arcpac, a system consisting of six of the company's Attached Resource Computers (ARC), for DP users who are beginning to venture into distributed data processing (DDP).

The hardware in the Arcpac — five 60K-byte Datapoint 3810 dispersed processors, a 120K-byte Datapoint 6600 Advanced Business Processor, CRTs and disk memory — is not new, a spokesman noted. What is new is the pricing, packaging and support, which includes Datashare, the company's business time-sharing system, three programming languages, and all necessary cabling.

The company is offering two systems differing only in the amount of disk storage. The Model 4724 includes 20M bytes of cartridge disk storage; the Model 4754 is configured with six times that amount.

Both systems include a 1,920-character CRT, type-

writer-style keyboard, an additional 960-character CRT and all necessary interprocessor bus components.

The languages on the system include Ansi Cobol (both interactive and batch) BasicPlus and RPGPlus.

The company built Arcpac in response to confusion or uncertainty expressed by some DP shops that arose from the wide range of choices available in the DP marketplace, the firm stated. "Many customers, even sophisticated ones, find it easier to relate to something presented in a packaged form — a sort of 'starter kit,'" a spokesman explained.

The Model 4724 sells for \$58,950 or leases for \$1,790/mo on a three-year basis. The Model 4754 sells for \$84,950 or \$2,580/mo.

One- and two-year leases as well as maintenance contracts are available for both systems, the spokesman said from Product Marketing, 9725 Datapoint Drive, San Antonio, Texas 78284.

## Univac CEs Impress Users With Hair Dryer Agility

(Continued from Page 29) virtually no damage to the bank's DP media, Weaver said.

By 1:30 the afternoon of the following day — just 33 hours after the Univac CEs arrived on the scene — 18 of the bank's 19 branches were in communication with headquarters. The remaining branch came on-line just hours later.

In order to prevent a similar

occurrence in the future, the bank is investigating the possibility of installing devices in its plumbing and heating system that would shut off an unrestricted flow of water.

And branch manager Geckler, of course, is hoping that no similar disaster occurs in the future.

Will hair dryers become a standard part of a CE's tool kit in the future? "I doubt it. I hope not," Geckler answered.

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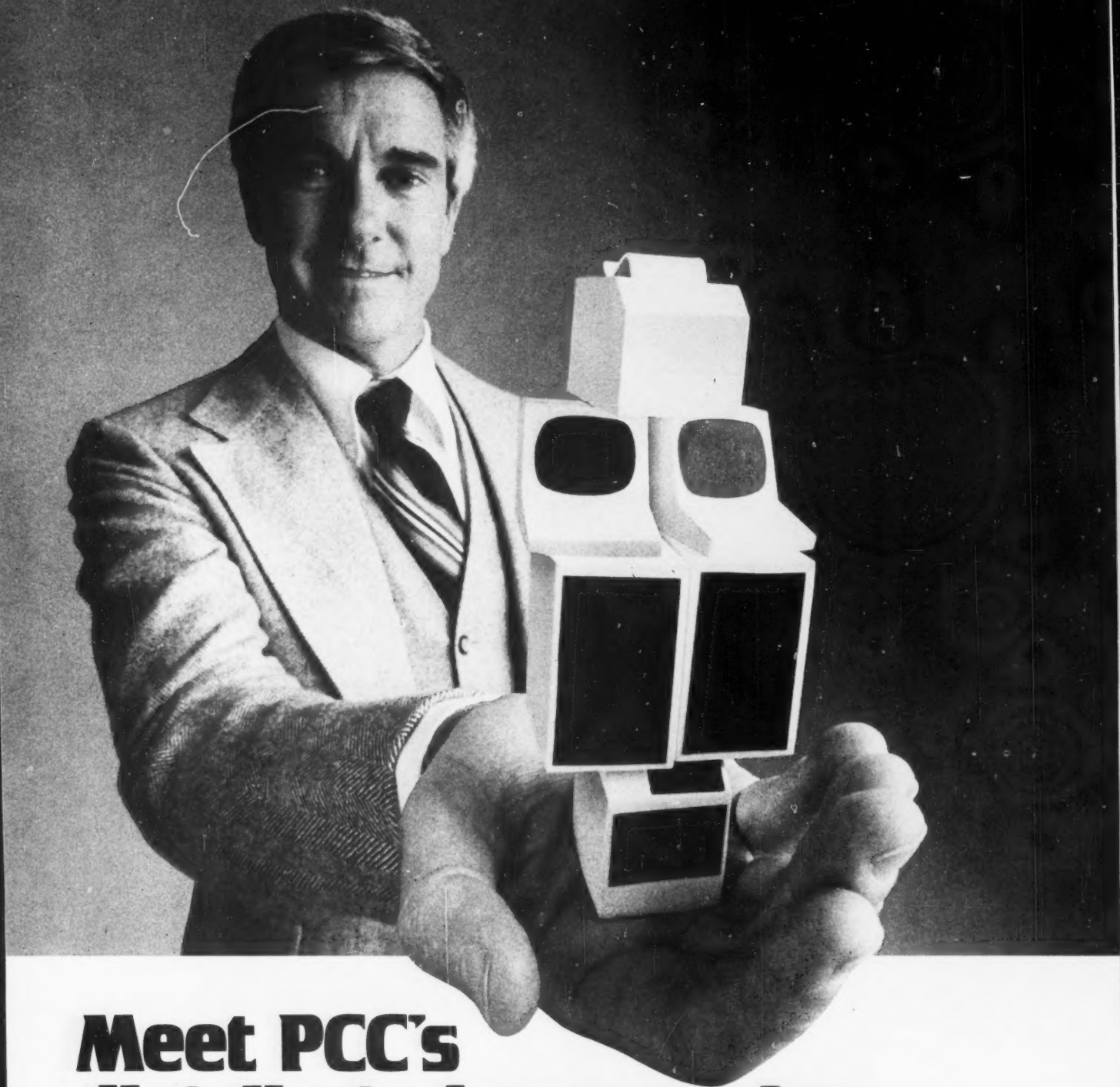
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360/20 HASP and 377X (SDLC)—plus 3270 host interactivity. And communications, along with data capture, file inquiry and report generation run concurrently.

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## Adds Subsystem Options Microdata Replaces Entire Reality Series

By Jeffrey Beeler

CW West Coast Bureau

IRVINE, Calif. — In one fell swoop, Microdata Corp. has replaced its entire Reality business systems series with an alternative family that reportedly provides enhanced performance while plugging some of the earlier line's most glaring gaps.

Although the latest Microdata family uses basically the same CPU and operating system as its predecessor, it sports several subsystem options previously unavailable to the firm's users.

Some of these options include:

- Microdata's first 800-nsec MOS main memory with parity check.

- An enlarged Reflex disk subsystem consisting of two 128.7M-byte drives for a total capacity of about 257M bytes.

- A 45 in./sec subsystem in both 800- and 1,600 bit/in. varieties.

- Four revamped printers, including Microdata's first 150 line/min unit.

These peripherals replace the Reality family's previous subsystem, which included a 1-microsec core memory, a 50M-byte disk unit and a 25 in./sec tape unit.

### Operating System Enhanced

In addition to incorporating different hardware, the latest Microdata small business systems line offers a set of enhancements to

the firm's Reality operating system.

Known collectively as Screenpro, the enhancements include a screen-building program and a screen-handling program. The screen builder provides step-by-step instructions for creating terminal display formats, while the screen-handler removes previously defined formats from user programs and makes them available instead to the Reality operating system's data/basic software.

Commenting on the significance of his firm's recent announcements, a Microdata spokesman credited the latest Reality systems family with filling longstanding voids in the company's business products line.

The source also credited the most recent Microdata introductions with offering additional configurations that extend the Reality series to selected users who previously could afford neither its hardware nor its operating system.

### Three Reality Series

With Microdata's latest announcements, the Reality line now consists of three systems series — the 2000, 4000 and 6000.

At present, the 2000 series incorporates just the Model 2200 system, while the 4000 series embraces both the models 4520 and 4530. The 6000 series, by contrast, consists of three systems models — the 6550, 6580 and 6790.

The 2200 compares roughly to Microdata's Vantage system, a mid-range member of the previous Reality line, whereas the 4520 and 4530 have no equivalents among the firm's earlier small business systems. The 6000 series, meanwhile, corresponds roughly to Microdata's now-defunct Royale systems series, with the 6550 comparable to the Royale's C version and the 6580 comparable

(Continued on Page 35)

## Tests Find TI FS990/10 Suited For Technically Oriented Users

By Marguerite Zientara

CW Staff

BOULDER, Colo. — Texas Instruments, Inc.'s FS990/10 minicomputer is a cost-effective machine suited to technically oriented users who have few software support requirements, according to a *Benchmark Report* from the Association of Small Computer Users (Ascu).

The report is part of a series on minicomputers with the same general configuration and was based on tests conducted for Ascu by Real Decisions Corp. of Stamford, Conn., an independent consulting firm. In the study of the FS990, TI earned high marks in the areas of hardware, cost efficiency, service and overall excellence.

Real Decisions ran five standard programs and conducted an "ease-of-use" test on the system. The firm also analyzed responses to a user survey.

Most TI users are "highly skilled people" familiar with the technical aspects of hardware operation, the report noted, and users seeking a "neatly packaged hardware/software configuration with usable applications packages will not be comfortable dealing directly" with TI.

The programs run on the TI equipment consisted of a CPU-intensive job of varying parameters, an I/O-intensive job of varying parameters (both speed tests), a scientific/engineering job, a new product planning problem, an accounts receivable generation, update and report (all solving "real-life" problems) and a script-based editing job (testing ease of use).

### Run in Basic

All benchmarks were run in Basic (although most users interviewed as part of the study utilized Assembler) on a packaged configuration priced at \$16,745 and including the mini with 64K bytes of memory, two diskette drives with 256K bytes of storage each, CRT and keyboard and a 150 char./sec printer.

Initially, the benchmark programs were evaluated for compatibility of Basic support, the 24-page report noted. Some problems arose in the area of I/O statements, which in one case required the rewriting of several statements before the program would run.

In addition, only 27,000 bytes of the machine's 64K of memory were available for the benchmark programs, since the operating systems and the Basic interpreter took up the rest.

The memory limitation necessitated redefining the array of two programs, originally dimensioned at 3,000, as an integer array so that less memory was required, the report

noted.

Furthermore, memory limitations prevented loading the scientific/engineering program, which could not be run in the 990's standard Basic. Results were finally obtained by using Power Basic from TI's Semiconductor Division.

TI's Basic language was found to have shortcomings, such as the absence of error-checking diagnostics while the program is being created, as well as a minimal implementation level.

### Highly Reliable

In spite of the foregoing problems, 15 "contented users" reported "a high degree of satisfaction with the reliability and capabilities of this equipment."

(Continued on Page 36)



HP 300 and Workstations

## Extended Range of Peripherals Enhance HP 300 Business Unit

PALO ALTO, Calif. — Hewlett-Packard Co. announced the expansion of several of its peripheral products for the HP 300 line of business systems. Included in the announcement was the HP 300 Workstation, a CRT station said to provide features for program development and for applications previously possible only on the HP 300 itself.

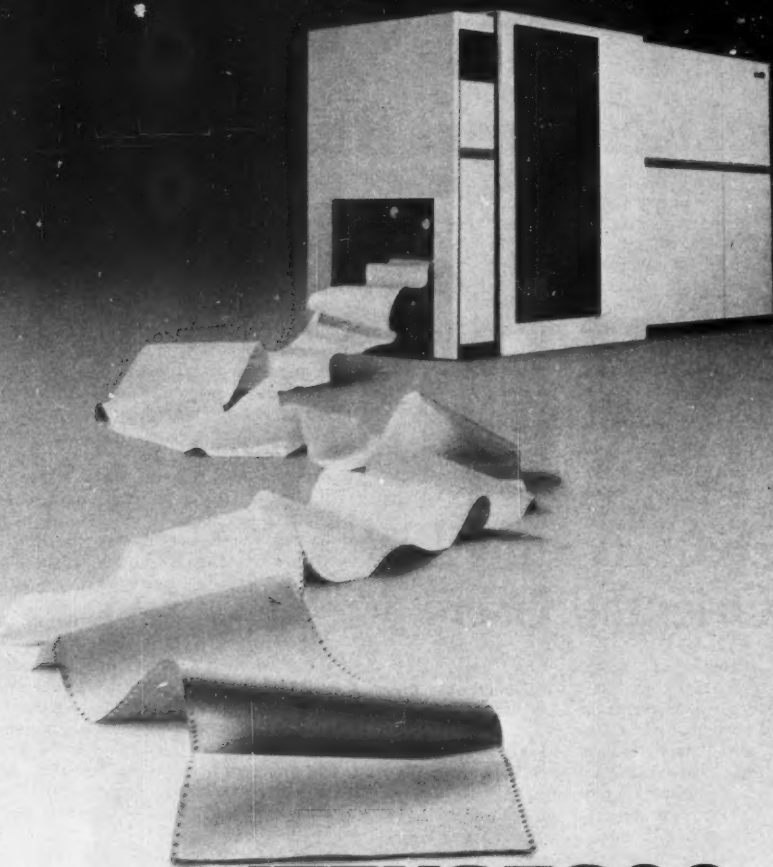
The firm also announced support for the HP 2608A line printer, an increase in total disk capacity to 490 million characters, a capability for IBM 3741 media interchange and remote terminal communications using a range of asynchronous modems.

The HP 300 itself, a virtual memory system allowing both multiprogramming and multitasking, was designed for use directly in an office environment. Identical in appearance to the HP 300, the HP 300 Workstation is actually a CRT terminal attached to the HP 300 that provides an interactive interface to the computer's resources, the firm claimed.

For example, eight "soft keys" to the right of the CRT screen allow push-button selection of major application of programming functions, a spokesman said. The CRT can

(Continued on Page 36)

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For further information, contact ITEL Corporation, Computer Peripherals Division, One Embarcadero Center, San Francisco, California 94111, (415) 955-0391.

# **ITEL**



## Portable Unit Holds Four Drives

BURLINGTON, Mass. — A portable minicomputer system capable of supporting up to four double-density mini-floppy disk drives for random and sequential access of 1.4M bytes has been introduced by Computer Devices, Inc. (CDI).

The Miniterm Pro Model 1206/DOS includes a disk operating system, an integral disk controller able to support up to four drives, a 64K-byte processor programmable in Basic, a 50 char./sec thermal printer, a 128-char. Ascii keyboard, minicassette storage and an RS-232C or acoustically coupled communications interface, a spokesman said.

Since the portable unit weighs less than 25 pounds, it can be used for such things as inventory control, field data entry or point-of-transaction processing in the warehouse,

office or home, he added.

Each Minifile disk drive is approximately the size of a dictionary, weighs less than five pounds and is available in either single- or double-headed configurations.

The Minifile drives accept 5.25 in. diskettes capable of providing 180K bytes (single-sided) to 360K bytes (double-sided) of file storage, the spokesman said.

### Standard Software

Standard software includes the CDI Executive package offering 16 utilities, CDI disk-extended Basic, both random-access memory (RAM) and disk editors and a debugging package.

Optional CDI program utilities available include a CDI text processor, a line-oriented editor, a macro assembler, a linking loader, a cross-

reference utility and an assembler for preparation of machine language programs.

An optional acoustic coupler and built-in modem allows the Miniterm Pro to operate not only as a stand-alone processor, but also as an asynchronous send/receive (ASR) terminal or a dispersed processor linked to a larger mainframe via telephone lines in a distributed data processing network, the firm said.

The Miniterm Pro computer costs \$5,485, exclusive of disk drives. The price for the disk operating system and one single-sided disk is \$1,590; each additional disk costs \$750. For the disk operating system and one double-sided disk, the price is \$1,740; each additional disk costs \$890.

CDI is located at 25 North Ave., P.O. Box 421, Burlington, Mass. 01803.

## Microdata Replaces Reality Series

(Continued from Page 33)  
to the Royale's D version.

Like the 4520 and 4530, the top-of-the-line 6790 has no exact counterpart among earlier Microdata systems, although in its basic configuration the 6000 series member resembles the Royale D, the spokesman explained.

In performance, the three latest series of Microdata systems compare to the IBM System/34 and System/38, Univac BC/7 and NCR Corp. 8200 series, the source said. They also span basically the same range of configurations as the Basic/Four Corp., Qantel Corp. and Wang Laboratories, Inc. small systems lines.

Microdata described its latest Reality family as "100% compatible" both within and across its three systems series. In other words, a user of the bottom-of-the-line 2200 can upgrade its configuration to any larger Reality system without replacing its CPU or altering either its operating system or application programs, the spokesman said.

Although Microdata's re-

cently announced configurations offer subsystems previously unavailable to the firm's users, not all members of the modified Reality line can accommodate those hardware options.

The MOS main memory modules, for example, fit only the two largest Microdata systems — the 6580 and 6790 — while the rest of the family still uses core memory. On the other hand, Microdata's Reflex disk subsystems are suitable throughout the Reality line except for the low-end 2200, which uses the firm's Marathon disk units.

Both the 2200 and 4520 start with as little as 16K bytes of core main memory and expand to 64K bytes, while the two largest Reality systems — the 6580 and 6790 — require 64K bytes of MOS memory and support as many as 128K bytes.

Meanwhile, the two intermediate systems — the 4530 and 6550 — start with 32K bytes of core and expand to 64K bytes and 128K bytes, respectively.

### Support 32 CRTs

All members of the latest Reality line support up to 32 Prism CRT terminals except for the 2200, which accepts a maximum of only eight.

As for disk capacity, the 4520 and 4530 hold up to 40M bytes, compared with a maximum of 200M bytes for the 6550 and 6580. At the extreme ends of the line, meanwhile, the 2200 expands to accommodate up to 20M bytes, while the 6790 provides up to 514.8M bytes.

In its basic configuration, the 2200 incorporates a CPU with 16K bytes of core main memory, a 25 in./sec tape subsystem, 10M-byte Marathon disk subsystem, one CRT terminal and a 165 char./sec printer.

Such a configuration costs \$32,500.

Users, however, can replace the 25 in./sec tape subsystem with a 45 in./sec unit and can swap the 165 char./sec printer with either a 150 line/min, 300 line/min or 600 line/min variety.

A basic 4520 system with a 16K-byte processor, 20M-byte disk subsystem, one terminal, a 25 in./sec tape subsystem and a 165 char./sec printer sells for \$38,550.

A minimum 4530 configuration, costing \$44,950, incorporates a 32K-byte CPU, 30M-byte disk subsystem, one terminal, a 25 in./sec tape subsystem and a 165 char./sec printer.

A basic 6550 system with a 32K-byte processor, 50M-byte disk subsystem, two terminals a 25 in./sec tape subsystem and 150 line/min printer costs \$61,250.

A minimum 6580 configuration, which sells for \$75,950, starts with a 64K-byte CPU, 100M-byte disk subsystem, two terminals, a 45 in./sec tape subsystem and a 150 line/min printer.

A basic 6790 system, by contrast, begins with a 64K-byte processor, 257.4M-byte disk subsystem, two terminals a 45 in./sec tape subsystem and a 300 line/min printer. The price of such a configuration totals \$93,950.

All six members of the renewed Reality family use Microdata's Model 1600 CPU with the firm's Reality operating system.

Shipments for each member of the line take 90 days except for the 6790, which has a 150-day delivery leadtime.

The 2000, 4000 and 6000 series Reality systems are available from Microdata at 2361 McGaw Ave., Irvine, Calif. 92714.

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"Stretching the DP dollar" will be the theme of a *Computerworld* special report in September. We'd like to hear about the methods you've used to stretch your DP budget — or the problems you've encountered trying to do so — so we can share them with other readers.

All contributions should be typed, double-spaced and about four or five pages long. Send them to Howard A. Karten, *Computerworld*, 797 Washington St., Newton, Mass. 02160.

## Symposium Seeks Papers

ANAHEIM, Calif. — The International Society for Mini and Microcomputers (ISMM) is seeking papers and tutorial proposals for its international symposium on microcomputers to be held in Monterey, Calif., Jan. 30-Feb. 1.

The symposium will highlight technology, hardware, software engineering, languages, systems architecture and design methodology. It will also address computer networks, performance evalu-

ations, concurrent processing and real-time processing.

Camera-ready copies of 200-word abstracts should be sent in triplicate by Sept. 1 to Secretary, Mimi-80 (Monterey), P.O. Box 2481, Anaheim, Calif. 92804. Notification of acceptance will be sent by Oct. 1; camera-ready copies of accepted papers are due Dec. 15.

Proposals for half-day and full-day tutorials are also being solicited and should be received by Sept. 1.

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## Memory Subs For DEC MS11L

IRVINE, Calif. — A semiconductor memory that replaces Digital Equipment Corp.'s MS11L unit and features 256K bytes parity memory on a single hex circuit board has been announced by Plessey Peripheral Systems. The PM-S11L has extended addressing capability of up to 4M bytes with two 10-position switches allowing memory start or stop on any 8K-byte boundary in the 0- to 4M-byte range.

The 256K-byte version costs \$4,670 from 17466 Daimler, Irvine, Calif. 92714.

# Range of Peripherals for HP 300 Extended

(Continued from Page 33)

be split into multiple windows to view and operate on different parts of a program or different application functions simultaneously, he added.

Data can be scrolled horizontally or vertically for display or editing. An "attention key" reportedly allows the user to shift to other activities without disturbing ongoing applications of program development.

Workstations can be converted on-site into full HP 300 systems, the spokesman noted.

## Other Peripherals

Also available for the HP 300 is the 400 line/min HP 2608A printer and the HP 2631A serial printer, with speeds up to 180 char./sec.

In addition to a built-in 12-million-character disk of the HP 300 system, combinations of the HP 7906 disk (20 million character), HP 7920 disk (50 million character) and HP 7925 disk (120 million character) can be used for total disk storage capacity of up to 490 million characters, the spokesman said.

A media conversion utility reportedly enhances the HP 300's built-in flexible disk drive so it can read data and industry-standard RPG-II programs from systems having IBM 3741-compatible diskette media.

Furthermore, with the support of communications via asynchronous modems, CRT terminals can now be used at remote sites as well as locally, the spokesman said.

Modems that can be used are the Bell 103, 113C and 113D with speeds up to 300 bit/sec and the Bell 212A, operating at speeds up to 1,200 bit/sec.

The HP 300 Workstation costs \$12,500; an on-site upgrade costs \$23,000. In addition to normal CRT terminals, up to two Workstations can be added to the HP 300.

The HP 2608 line printer costs \$9,815 and the HP 2631 serial printer is priced at \$3,440. Disk prices range from \$10,000 to \$17,000.

The HP 300 system costs \$35,000, including the Integrated Display System (IDS), 256,000 characters of main memory, a 1 million-character flexible disk drive and a 12 million-character fixed disk. HP Business Basic, RPG-II, SL/300 (a system programming lan-

guage) and the Image/300 data base management can be added.

Quantity and third-party discounts are available, HP said from 1507 Page Mill Road, Palo Alto, Calif. 94304.

## Report Lauds TI 990 Machine

(Continued from Page 33)

In most cases, the 990s were being used as development tools in engineering labs to build hardware/software for flight computers, air missile systems, advanced electronic games, air traffic control and point-of-sale systems.

These scientific users appreciated the FS990's modularized approach, which allows the addition of memory boards and other capabilities for vertical expansion, the report noted.

"These hardware-wise users are convinced that no other vendor manufactures as much mini for the money," the report stated.

Users interviewed cited a "notable absence of downtime" and gave "high praise indeed" for the responsiveness of field service personnel, according to the report.

Even with the problems experienced with TI's Basic language, the FS990/10 was found to compete well in the I/O-intensive tasks and the accounts receivable problem.

When the scientific/engineering program was rerun using Power Basic, the results were competitive with those of minis tested earlier, including the IBM 5110, the Datapoint Corp. 1170 and the Wang Laboratories, Inc. 2200VS, the study found.

In addition, TI chose to demonstrate — successfully — how Fortran IV (the language initially offered with the FS990) could improve the CPU-intensive and scientific/engineering results using Basic, the report said.

Noteworthy in relation to the high regard users had for the TI equipment is the fact that, in contrast to prior surveys, "these users had not only investigated minis offered by Digital Equipment Corp., Data General Corp. and Hewlett-Packard Co., but they were well acquainted with competitors in the micro field."

The TI study, the fifth in the series, will be followed by a *Benchmark Report* on the DEC PDP-11/03. Following that, Ascu will print a summary of results from the first six studies.

For 12 issues, *Benchmark Report* subscriptions cost Ascu members \$150 and nonmembers \$190. Ascu membership costs \$25. The organization can be reached through P.O. Box 9003, Boulder, Colo. 80301.

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## Identity Crisis — Part 2 •

# Micro Makers Now Tooting Their Horns

By Jim Edlin

Special to CW

NEW YORK — The National Computer Conference and the Consumer Electronics Conference (CES) offered vendors an opportunity to display products that revealed notable trends in microcomputing.

Furthermore, the high-flown promotional verbiage that accompanied some of these product introductions indicated the makers are taking an optimistic view of their products.

"Your life will never be the same," trumpeted APF Electronics, Inc. in announcing its Imagination Machine.

"It will revolutionize the way you live," Telecomputing Corp. of America (TCA) said about a "new kind of utility as vital as the telephone, as powerful as electricity" that allows home computer owners to dial into a large data base and program library.

"For every member of your family. For right now," said Texas Instruments, Inc. of its new TI-99/4 Home Computer.

While other companies didn't wax so eloquent, they introduced products with the confidence of people who had already been once around the track.

RCA took another stab at turning its VIP product into a true consumer computer, showing the VIP-II with help from former Commodore PET Business Systems, Inc. staffer Terry Lauderneau.

EACA Electric of America in-

## Notable Trends

- Some of the most aggressive pioneers of personal computing began turning their attention — and their heaviest artillery — toward the small business market.
- People who had been in key positions in those pioneering companies are joining new entrants in the industry, spawning a school of hardware look-alikes.
- The "invasion" of the market by offshore manufacturers, predicted and feared by some in the industry, seemed poised to begin.
- The size of the basic "personal" computer unit appeared likely to drop by at least one order of magnitude.
- The promotional rhetoric associated with personal computers seemed to increase by a similar factor.
- Hardware manufacturers have become impressed with the business necessity of having a rich software pool available for their machines, and many began trying to satisfy the need themselves.
- Fertile cross-pollination between microcomputer products and products of other industries is beginning.
- Distributors are beginning to do some of the selling for the manufacturers.
- Word processing and music synthesis have become "hot buttons."
- Communications opportunities for micros are beginning to open.
- Slickness of exhibits is now the rule.

roduced its \$500 Video Genie, built with electronics from the Far East and marketing direction from Commodore alumnus Sam Bernstein. The Video Genie is software-compatible with the TRS-80, but the design was influenced by the Commodore PET.

Both new entries and CES/NCC returnees showed up armed

with plenty of applications software.

Interact Electronics, Inc. and Broadrein Instrument Co., which first showed their personal computers at CES a year ago, were back with long, multicolored shelves of software packages for use with the hardware. Software for Broadrein's Cybervision was subdivided into a game series, a

party series, a scratch pad series and an educational series.

Similar categories were used for the "Solid-State Software" programs in read-only memory (ROM) introduced by TI for its home computer. Running samples included football, chess, grammar, budget and physical fitness programs. APF's Imagination Machine offered a typing tutor and electronic files among its two dozen titles on display.

Exidy, Inc. shared its booth space at both shows with CompuMax Associates, Inc., which offered a full line of general business software to be used with Exidy's Sorcerer computer.

### Four-Part Harmonies

Two software/hardware combinations of which there seemed to be a particularly large supply were music synthesizers and word processors.

The personal computer at CES that lacked a music box of some sort was a poor orphan indeed. Music played an important part in the demonstrations of Atari, TI, RCA and Apple Computer, Inc., among others.

The synthesizers were becoming more sophisticated, too. Many could play in four or more "voices" at once and displayed what they were playing on standard music staves using all the customary symbols. Others accompanied the music with an impromptu light show based on color graphics.

Word processing software was offered by almost everyone who had business aspirations; many vendors are moving into the league established by such word processing pros as Wang Laboratories, Inc. and Vydex, Inc.

Exidy, struck by the responsiveness of booth visitors to their word processor "ROM-Pack" software demonstration, began running the word processing demonstration on most of its display machines.

As a result of the new interest in word processing, printers took a share of the spotlight, too. Daisy-wheel printers invaded the halls of CES to appear side by side with pong games and pornographic videotapes from Sweden.

(Continued on Page 38)

## Percom Adds to Software Line

GARLAND, Texas — Percom Data Co., Inc. has expanded its 6800 microcomputer software products line to include an assembler-linking loader, three disassemblers, a relocater and a monitor with debugging conveniences.

The programs, excluding the monitor, are available on either cassette or disk. The monitor is available in erasable programmable read-only memory (Eprom).

The relocating assembler and linking loader produces relocatable object code and features alphabetized cross-reference listing and global and local labels, the firm said. The assembler and loader together require less than 10K bytes of memory and are furnished in relocatable formatted code. The unit costs \$50 on tape and \$55.95 on disk.

### Generating Compacted Code

The relocating disassembler and segmented source text generator produces compacted code for reediting and assembly using the relocating assembler and linking loader. A segmenting feature lets users break down large object programs into small source modules.

Furnished in relocatable formatted code along with instructions and assembly listing, it costs \$35 on tape and \$40.95 on disk.

A disassembler/source generator produces compacted source code suitable for reediting and assembly with the user's assembler program. Data is generated for computing the size of the random-access memory (RAM) required for assembly of the source code generated.

The program requires 4K bytes of RAM and costs \$25 on tape and \$30 on disk.

### Examining Memory

The disassembler/trace debugging program allows the user to examine and/or execute any area of memory including read-only memory (ROM) or programmable read only memory (Prom) with full operator control. The program requires approximately 2,300 bytes of RAM and costs \$20 on tape and \$25.95 on disk.

The relocater relocates a program from any contiguous area of memory — RAM, ROM or Eprom — to anywhere in RAM. It moves programs without making any adjustments and will ad-

just a program in RAM to operate at another address without actually relocating the program. The program costs \$20 on tape and \$25.95 on disk.

The monitor, called Smithbug, contains 2K bytes of Eprom. It provides 25 commands, includes debugging functions and requires an asynchronous communications interface adapter and 128K bytes of RAM. The monitor costs \$70.

Percom is at 211 N. Kirby, Garland, Texas 75042.

## Billing Software Available For TRS-80 Level II Micro

DUNSTABLE, Mass. — Client billing software that uses a 48K-byte Radio Shack TRS-80 Level II microcomputer, three mini-disks and a line printer has been developed by Small Business Systems Group.

The package can support up to 999 clients, 99 pre-coded activities and 3,000 outstanding transactions. All information is available to the user via CRT; hard-copy reports can be printed on command.

Year-to-year hours and dollars are also produced for clients, employees and activities.

The package costs \$450 and includes three diskettes with the programs, sample data for training exercises, sample reports and source documents and a user manual.

The manual is available alone for \$40, refundable on the purchase of a complete system, the firm noted from Groton Road, Dunstable, Mass. 01827.

# MICROCOMPUTING

# Micro Makers Strut Their Stuff at NCC, CES

(Continued from Page 37)

In the Ohio Scientific, Inc. booths — all three of them — salespeople displayed the hardware and software which interfaced the computers to the X/10 home control system from BSR and the home security system from Norelco.

By taking advantage of existing products this way, manufacturers can extend the usefulness of their systems without overextending themselves on design and manufacturing projects others can handle far more easily. Ohio Scientific's approach is the wave of the future.

Another kind of "cross-pollination" was evident at Milton-Bradley's booth at CES, where the toy and game manufacturer was displaying games for use

with TI's home computer.

Use of the micro-computer as a communications tool was boosted by announcements from Radio Shack and TCA. Radio Shack announced that TRS-80 owners could gain access to Western Union's Mailgram service by phone. TCA told attendees it was selling franchises for a phone utility that would allow subscribers to dial in and connect their personal computers to United Press International news reports, Ticketron outlets, recipe files, a game bank and many other things.

Two other signs of the micro industry's maturity brought out in the shows were the appearance of third-party distributors and the slickness of the exhibits.

Microage, Inc. and CMC Marketing

Corp., distributors of lines of assorted micro products, exhibited at both events.

The merchandise distributed by Microage included several business software packages and a selection of personal and business hardware. CMC Marketing showed the CompuCruise automobile computer system, the Compucolor computer and the Dimension Delta business computer system.

Computalk Consultants, Inc., which had previously represented itself, turned over distribution of its speech synthesizer to Omni Computer Corp.

The Ohio Scientific and Compucolor Corp. booths exemplified the change that has taken place in exhibit quality over the last couple of years, although

the change was more evident at CES than at NCC.

Last year's Ohio Scientific display at CES was basically a big, open rectangle of folding tables supporting the computers in nice, straight lines. This year the company erected custom-built walls with handsome if dull graphics, gave some demonstrations that commanded attention and employed a fair number of representatives to volunteer help and information.

Two years ago, Compucolor had a minimal booth with a couple of demonstration machines attended by one person. This year, its expansive display included a little theater for audio-visual presentations.

The new entrants to the industry, such as Atari and TI, came with elaborate booths, well-trained demonstrators with flawless presentations showing evidence of extensive planning and rehearsal and highly professional printed and audio/visual materials.

The rapid advance of the micro industry could be seen in its exhibits at both shows this summer. But a hint of the advances and directions yet to come could be seen as well at exhibits which had nothing to do with micros.

Three exhibits from the video industry, for example, suggested possible new approaches to data storage and retrieval. Sony/Tektronix Corp.'s Beta-max video recorder, which allows random access to individual video frames, offers a new data storage medium if used for digital instead of video recording.

Toshiba's LVR fixed-head video recorder, with 220 parallel tracks each holding 17 sec of video on an endless loop tape, might be an inexpensive replacement for hard disks.

The Magnavision video disk from Magnavox, which can hold more information on one \$9.95 "silver platter" than can be contained in three average sets of encyclopedias, has the potential to make computer-accessible data bases available.

ITT's telephone answering machine with voice-activated remote control suggests the day of more extensive voice input isn't far away, and TI's talking language translator does the same for voice output.

And at the "Innovation Center" in Sharp Electronics Corp.'s exhibit at CES was something that put the future of the microcomputer into perspective.

It was called the Ratecaputer. It was one of those attache-case-sized combinations of radio, TV and audiocassette player. But at the bottom of this one was a quarter-inch-thick drawer. Pull it out and — you guessed it — a computer keyboard.

It wasn't being offered for sale yet. But watch out. Because it was a working model.

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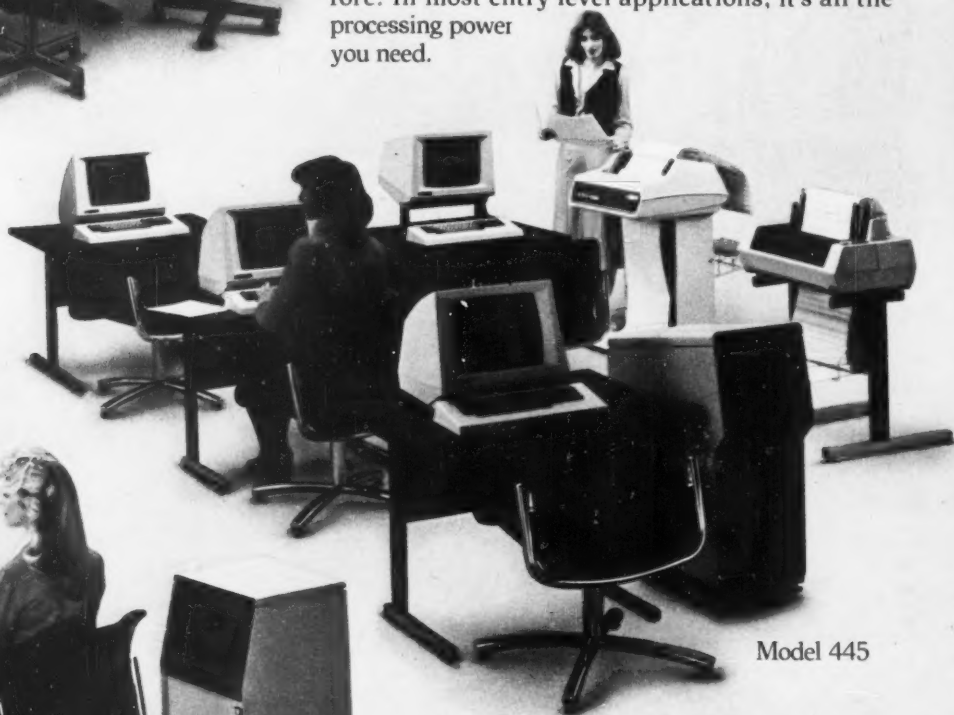
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# Data Concentrator Gains Built-In Test Feature

CHATSWORTH, Calif. — A built-in test feature has been introduced for Micro Systems, Inc.'s Micro 800 data concentrator.

Designated the Terminal-Activated

Channel Test (Tact), the feature allows any terminal connected to a Micro 800 concentrator system to activate a self-test to verify its own operation, the operation of the local Micro 800 or the

complete Micro 800 system end to end, according to the firm.

Tact includes a built-in "fox message" generator and a series of local and remote loopback test modes, all of which may be activated by special command

from any terminal, the firm said.

The Tact feature costs \$200 and may be installed in any model of the Micro 800 data concentrator. The firm is located at 9551 Irondale Ave., Chatsworth, Calif. 91311.

## Z80 Logic Analyses Aided

SAN JOSE, Calif. — Paratronics, Inc. has added a probe accessory for the Model 532 intelligent logic state analyzer that allows the capture of address and data information in Z-80 microcomputer systems.

The Model 54 clips directly onto the Z80 and generates the signals required to directly capture program flow while ignoring refresh

cycles, wait states and other non-pertinent information, the firm said.

The analyzer also features qualifier switches that augment the Model 532's standard trigger and clock qualification controls.

The Model 54 is available for \$150 from Paratronics, Inc. 122 Charcot Ave., San Jose, Calif. 95131.

## Software Club Starts Up

LOS ANGELES — Creative Discount Software, a software distributor, has announced a Software of the Month Club which will have separate branches for users of most of the popular microcomputer systems.

Members will be offered a choice of divisions such as business, education, high-level languages, games and fun applications and personal and home

management applications.

The club will capitalize on volume purchasing power to offer favorable prices to members. Membership enrollment applications are available from Creative Discount Software, Software of the Month Department, P.O. Box 24-B-67, Los Angeles, Calif. 90024.

## Intel Software Prize Goes to Naval School

SANTA CLARA, Calif. — The Naval Postgraduate School Foundation at Monterey, Calif., has won the grand prize in Intel Corp.'s Insite User's Library contest, a microcomputer software contest.

In an award ceremony held recently at the school, the foundation was presented with an Intel Microcomputer Development System and a Prompt-80 worth more than \$15,000, according to Intel.

Sponsored by Insite, Intel's user software library, the contest drew entries from more than 30 universities in the U.S. and Canada. The winning entry was a text processor and text editor developed by Lt. Col. Triyono, an Indonesian Army officer. This program facilitates line-oriented text editing and text formatting.

Ten universities received their choice of an Intel Prompt-48 or Prompt-80 design aid in recognition of their efforts.

## DEC, Data General, H-P communications costs are down

If you're supporting remote terminals on your DEC, Data General, or H-P system, with more than one terminal per location, chances are you are paying a fortune in communications costs and probably not even running the terminals as fast as you'd really like to. And to add insult to injury, you have to put up with the occasional phone line glitch which drives your CRT's crazy.

What you really need is a smart little box that will provide error control for your terminals and allow several of them to share one telephone line, contending for the line when they need it, not each paying for a dedicated transmission facility all day.

Well, look no further. MICOM SYSTEMS, INC., one of the pioneers in the application of microcomputers for data communications, has put it all together in the Micro800 Data Concentrator. The Micro800 represents a major breakthrough in low-cost data concentration, sometimes referred to as statistical multiplexing. Allowing up to 16 terminals to share a single phone line, it requires absolutely no changes to the hardware and software you have installed today. And prices start as low as \$1150 for a 2-channel unit.

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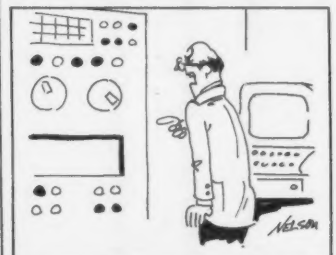
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# More Resources for Design Centers for Semi Manufacturing Urged

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — The establishment of government-backed semiconductor manufacturing centers was proposed here recently during congressional hearings on U.S. technological innovation.

Dr. Carver Mead, a computer scientist from the California Institute of Technology, told the Senate Science, Technology and Space Subcommittee the huge cost of fabricating semiconductors is stifling design innovation in semiconductor technology.

Centralized manufacturing facilities could be shared by numerous firms, allowing them to direct all their resources into design experimentation, according to Mead, who warned that the U.S. semiconductor industry will otherwise be overtaken by Japanese and European rivals.

Mean, associate director of Caltech's Com-

puter Science Laboratory is Pasadena, said that having every semiconductor company provide its own fabrication facilities is like forcing all authors to work for large printing companies. The result would be a lack of literary variety, similar to the dearth of innovation in today's semiconductor industry.

Mead made his plea for "a kind of freedom of the press for the silicon business" at June 21 hearings on the National Technology Innovation Act, a bill sponsored by Subcommittee Chairman Adlai E. Stevenson III (D-Ill.). The legislation proposes to establish an Office of Industrial Technology within the Commerce Department that would work with industry and academia to establish centers for industrial technology. The bill would authorize the expenditure of \$270 million over the next five years to support joint industry-university research at the technology centers.

Opening the June 21 hearings, Stevenson said the legislation and a concurrent Administration "Domestic Policy Review of Industrial Innovation" [CW, Feb. 5, 27] are only "a tentative first step" that must be taken "if the United States is to compete in the new, highly competitive global marketplace."

## Small Firms Credited

In the recent hearings on the bill, Mead was joined by several industry and university representatives in voicing support for the legislation. Using the semiconductor industry as an example, Mead told the subcommittee that small, "new venture" companies are essential for exploiting new technology.

While many of the basic ideas that later became incorporated into semiconductor products came from established organizations, what really caused the technology "to take off" and grow so rapidly was the large number of small firms that brought the technology to the marketplace, he said.

"In the semiconductor business, there was wave after wave of new ventures," according to Mead, who said he has been a consultant to a number of these new firms in "Silicon Gulch." Now, however, "the outlook is not very good," he continued, predicting the U.S. semiconductor industry will soon be surpassed in innovation by overseas competitors.

The answer to the problem, he said, is for firms to spend more of their resources on design innovation. While once it was possible to start a company and get a semiconductor product on the market for about \$1 million, the fabrication technology has been so refined and become so demanding that a company now has to spend about \$20 million before it can enter the marketplace.

It is almost impossible to raise that kind of venture capital, Mead said. As a result, the rapid proliferation of semiconductor firms that was seen a few years ago has slackened off considerably.

Mead then proposed that a central semiconductor fabrication facility could be accommodated under the Stevenson legislation. Numerous firms could use the facility, which "could very rapidly become a money-making business," then be spun off as a for-profit organization.

## Bell & Howell Makes Jump Into Market for Data Displays

By Marcy Rosenberg

CW Staff

SALT LAKE CITY, Utah — Bell & Howell has entered the video display business with products targeted for the OEM computer terminal, word processing and medical markets.

As evidence of its commitment to this venture, the firm formed a new division, Display Devices, and plans to lease a 60,000 square-foot design and production facility

here solely for display products, according to Phil Drachman, who is heading the project.

Drachman sees a growing demand for display devices. He predicted a 25% yearly increase in the worldwide terminal market from a current \$750 million to \$1 billion by 1980.

Drachman was transferred earlier this year from Bell & Howell's Video Systems Division to take the reins as Display Devices marketing manager for domestic and international OEM sales. He will be joined by three new hires, a general manager and two regional sales managers, one each for the southern and northwest territories.

The Display Devices Division is readying its first products — 5-, 9- and 12-inch monochrome data display monitors. These will be sold to the computer industry and other OEM markets under the Bell & Howell name and to professional video markets as products of Telemation, a Bell & Howell division that manufactures professional television equipment.

Currently, Display Devices shares Telemation.

(Continued on Page 45)

## Magnuson Gels Venture Funding

SANTA CLARA, Calif. — Although still a "new kid in town," Magnuson Systems Corp., a fledgling maker of IBM plug-compatible machines, recently completed its second round of venture capital funding and signed a marketing arrangement with Boothe Computer Corp.

The company concluded its latest round of venture capital financing in an "oversubscribed position," raising nearly \$10 million — almost twice the amount of capital it sought, Joseph L. Hitt, the firm's president, claimed.

The company views its funding success as a "test case" that proves plug-compatible manufacturers can attract investors despite IBM's increased competitiveness.

The new capital will be used to step up production of the firm's M80 series of processors, which primarily compete with the IBM 4341. Magnuson credited its ability to compete with IBM to its modular design concept called "Strategic Architecture." This permits the smallest M80 to be expanded to the largest M80 by firmware modifications and plug-in card modules, features which the firm claims IBM's 4300 series does not have.

The conclusion of the funding comes at a time when plug compatibles may experience a surge in demand as deliveries for IBM 4300s stretch into 1982 [CW, June 25]. These long lead times appear to be one reason Boothe recently agreed to market Magnuson equipment.

Under the agreement, either Boothe or Magnuson will handle the financing of equipment. To that end, Magnuson recently obtained lease financing guarantees from several financial institutions.



Photos by C.J. Blumenthal

## Selling Like Hotcakes

BOSTON — The Computer Warehouse store of the American Computer Group, Inc. held a going-out-of-business sale here recently. The hottest item on the crowded sale floor was the Kim-1 microprocessor unit, a bargain at \$99.

Even with three cashiers on duty, some customers waited in line two hours to check out purchases. At the end of the day, 95% of all goods had been sold, Sonny Monosson, American Computer Group's chairman, reported happily.



COMPUTER INDUSTRY

# Chinese Development Plan Cites DP as Priority

By Bohdan O. Szuprowicz  
Special to CW

A \$69 million computer order received by Control Data Corp. from the People's Republic of China soon after diplomatic relations were established with the U.S. again focuses attention on the Chinese computer industry and its market potential for DP suppliers.

The "Chinese National Development Plan 1978-1985" singles out computer sciences, including semiconductors, supercomputers, microcomputers and computer networks, as one of its eight major priorities. There is now speculation that this may mean an increased tempo of DP equipment sales to China.

All such transactions, of course, are still subject to U.S. and Cocom export controls,

but there are signs of changing attitudes to these controls and even possible differentiation between exports to the Soviet Union, Eastern Europe and China.

What is unique about the CDC deal is not only that it is the largest single hardware contract ever awarded from a communist country. More importantly, the agreement calls for 10 Cyber 172 machines which means the Chinese have decided to give Western suppliers a reasonable share of the computer market generated by oil and gas exploration research.

This is significant because most previous sales to communist countries were usually single copies of the most advanced computers available to them. This raised the issue of prototype purchasing policies for reverse engineering purposes and made Western governments reluctant to approve such sales.

## Faster Automation

This large contract and the speed with which it was announced suggests the rate of computerization of Chinese industries may be faster than originally expected and raises the question of the best approach to achieve these objectives.

Large numbers of minicomputers, it seems, would pro-

vide the most economical means of automation in a great number of Chinese enterprises, which are relatively small in size. The big capital projects, such as the new steel plant being built in Paoshan by Nippon Steel of Japan, present a market for both a large system and several process control minicomputers.

Indeed, 16 such minis have already been approved for export to the Paoshan project by the Cocom committee.

If similar requirements for DP develop in all of the other 120 capital projects being undertaken by China within the current development plan, this could mean a requirement for at least 1,000 minicomputers and perhaps as many as 100 large computers because all projects will be modern industrial plants or mines and will call for some form of DP.

## Which Suppliers?

To what extent can China supply such minicomputers from its own domestic production and what market share of this estimated total might be available to Western suppliers? The Japanese minicomputer manufacturers clearly have an advantage in this market because many Chinese projects are being built by Japanese metal, petrochemical and other industries. Nevertheless, American and

European manufacturers have extensive experience using computers in various industries and can provide the most up-to-date software for minicomputer applications.

In this regard, the report of the latest delegation of 16 members of the Institute of Electrical and Electronics Engineers (IEEE) sheds some light on the subject. The American delegation spent 20 days in China and toured 16 computer research and manufacturing centers in Peking, Nanking, Shanghai and Canton.

Among its members were computer experts and scientists from IBM, Univac, Hewlett-Packard Co., TRW Inc., and several universities. This is the second IEEE delegation given access to Chinese computer facilities. The first, which toured China in November 1977, was primarily interested in telecommunications; the latest group concentrated almost exclusively on touring China's computer industry facilities.

## Two Series in Production

After inspecting many computer models, the members of the group reported that most computers manufactured in China fall into the category of minicomputers. They recognize two distinct series of machines in production.

The DJS-100 series consists of four 16-bit minicomputers ranging in speeds from 100,000- to 500,000 operation/sec. The DJS-130, believed to be the workhorse of the series, has a Data General Corp. Nova-type instruction set; at the Tsinghua University in Peking, at least 15 units were reported in use.

The DJS-100 series is apparently used mostly in process control, industrial automation and military applications.

The delegation also reported the existence of a DJS-200 series of four models, ranging from the DJS-210, a 16-bit machine with a reported speed of 100,000 operation/sec, to the DJS-260, a large computer using a 64-bit word length and capable of 1 million operation/sec speeds. There were indications a DJS-300 series is under development.

Most interesting was a report of a Cobol compiler being developed for the DJS-200 series of machines. This indicates the Chinese are becoming serious about massive use of DP in finance and management.

A new market may be shaping up as a result for suppliers of specialized business computer systems, distributed processing, data base software and other services that could contribute to the latest Chinese superleap towards modernization.

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## Executive Corner

• John L. Martin has been elected senior vice-president of engineering and operations and Joseph H. O'Connor has been elected senior vice-

president of finance and administration at Comsat General Corp. Also at the firm, Harry G. Gross has been elected assistant vice-president of operations and David W. Lipke has been elected assistance vice-president of Marisat System Management.

• Joel T. Martin has been appointed vice-president and general manager of Documentation, Inc.'s wholly owned subsidiary, Docuprint.

• Bernard F. Bradstreet has been named treasurer of Prime Computer, Inc.

• Gregory Kilgore has been named manager of government procurement programs and privacy and security, by the Computer and Business Equipment Manufacturers Association.

• James A. Doub has been named general manager for the Hewlett-Packard Co. facility planned for construction near Vancouver, Wash.

• Nestor M. de Armas has been promoted to president of Florida Computer Services.

• Informatics, Inc. has announced the retirement of John A. Postley, senior vice-president, from the company after more than 15 years of service.

• Matthew R. Peterson has joined Interactive Information Systems, Inc. as vice-president.

• Gene P. Carter has been appointed vice-president of sales at Apple Computer, Inc.

• V.A. Kluesner and F.T. Biermeier have been named vice-presidents at CPT Corp.

• Don Adams has joined Graham-Dorian Enterprises as Software Division sales manager and Brett Sloan has been appointed head of the firm's TRS-80 Division of software systems.

• Thomas J. O'Rourke has been added to Datum, Inc.'s board of directors subject to election at the annual meeting of the shareholders.

• David J. Eskra has joined Pansophic Systems, Inc. as vice-president of marketing of that company and its domestic and international subsidiaries.

• Robert L. Burns has been appointed manager of Bell & Howell's Computer Output Microfilm Division.

• Steven D. Riedel has been named vice-president of marketing at Northern Telecom Systems Corp.

• Leonard S. Shaw has joined Trans-Lux Corp. as vice-president of corporate planning and special opera-

tions.  
• Charles J. Johnson has joined Priam Corp. as vice-president of operations.

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## Mini/Micro Scheduled

ANAHEIM, Calif. — OEM systems suppliers and product end users will receive equal attention at this year's Mini/Micro Computer Conference and Exhibition slated for Sept. 25-27 at the Anaheim Convention Center.

The conference expects to offer 300 exhibits at the center's South Hall and has scheduled 24 technical sessions, four each morning and afternoon.

Sessions include "Pascal on Minis and Micros," "Distributed Processing and Terminal Systems," "IBM Watching: Products and Marketing in the '80s," "Future Developments in Small CPU Software," "Computer Graphics," "32-Bit Machines and Other Megamini," "Telecommunications from the User's Viewpoint" and "Memories: MOS, Bubbles and CCDs."

Among the companies planning to exhibit are California Computer Products, Inc.; Centronics Data Computer Corp.; Control Data Corp.; Hewlett-Packard Co.'s Desktop Computer Division and Systems Division; Lear Siegler, Inc.; Memorex Corp.; Tektronix, Inc.; and Texas Instruments, Inc.

The full registration fee, \$90, covers the program sessions and the show for three days; it will cost \$10 to attend exhibits only for three days.

## Bell & Howell Makes Jump Into Data Display Market

(Continued from Page 43) tion's 60,000 square-foot facility here for the design and manufacture of display products, but the new division is expected to move into its own building later this year. Full production is expected to begin in July.

"The growth of the CRT industry and the need for another source of supply of video monitors" prompted Bell & Howell to challenge Zenith, Motorola and Ball Brothers in this product arena, Drachman explained. He claimed his company has already received "over two dozen firm orders" for the new CRT displays.

Unlike other display monitors on the market that use

discrete components, Bell & Howell's use thick-film microcircuits which, according to Drachman, reduce the parts count in terms of manufacturing and improve reliability.

Said to provide up to 22 KHz horizontal scan frequency and up to 22 MHz bandwidth, each size raster scan monitor in the series is interchangeable with the others because of uniform electronics designs contained on a single printed circuit board, he added.

Terming his firm's prices "competitive," Drachman said a 12-inch unit costs less than \$100 in 1,000-piece quantities. Delivery is 30 to 45 days for evaluation units; production quantities will be available in October.

## UK Firm Licenses GTE to Market Viewdata Service in U.S., Canada

By Marcy Rosenberg

CW Staff

STAMFORD, CONN. — General Telephone & Electronics Corp. (GTE) has acquired licenses to market Viewdata and Prestel information services in the U.S. and Canada.

Denying industry reports that GTE would offer Viewdata as a tariffed, telephone service through one of its Telephone Operating Group subsidiaries, a company spokesman said the service will be marketed as "a nontelephone company offering."

GTE received Viewdata licensing from Inscac Viewdata, Inc., New York, the company licensed by the British Post Office (BPO) to market the service in North America.

Viewdata is a data-based information service which enables users to view in the home or office color text and graphics on a variety of subject matter transmitted over telephone lines to CRT terminals or modified TV sets.

GTE's initial plans call for a market test of the service using an undisclosed number of pilot commercial and home subscribers.

Dr. Lee L. Davenport, GTE vice-president and chief scientist, said that a number of

firms in the publishing, financial, news and entertainment fields have already expressed interest in participating in the service. He refused to name the companies, however.

Davenport heads up GTE's Viewdata project team, which includes staffers from the firm's Telephone Operating Group and Products Group.

"GTE is uniquely well qualified to offer this type of service," he commented, because the firm "is a leader in the manufacture of telecommunications, television and electronic systems and in providing a wide range of telephone and data-based information services."

### Working Together

Agreeing that GTE has "very many arrows in its quiver" in terms of terminal product offerings and communications and information services, Inscac President John Bately said his firm will work closely with GTE "to exploit the business and home markets."

Viewdata was originally developed by the BPO, which operates Britain's telephone system. The name was later changed to Prestel, currently offered as a public service in England.

The Viewdata name was given to a similar system developed by Inscac for the American market, Bately said. Inscac's Viewdata software is "an interactive information system that runs over normal voice-grade telephone lines and is displayable on color CRT terminals or on commercially available or modified TV sets," he added.

According to Bately, GTE will supply "certain hardware" for the Viewdata service. The GTE spokesman would not disclose what hardware the firm plans to provide nor would he commit to a timetable for the start or completion of market testing, except to say that the firm hopes to wind up market tests "later this year."

## Supershorts

The Coordinating Committee of the North Atlantic Treaty Organization gave the green light to Digital Resources Corp. to sell to the People's Republic of China six Prospector seismic data processing systems worth \$5.5 million.

ope Videotex Systems, Inc. (AVS), the new company will be responsible for all liaison functions with U.S. customers, regulatory agencies and other interested parties.



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Greyhound Computer Corp. formed a new subsidiary, EDP Marketing Corp., to purchase, sell and lease used computer equipment.

RCA has filed suit against Hazeltine Corp., charging that Hazeltine CRT terminals infringe RCA's Cole patent No. 3,345,548 relating to the conversion of digital information into video signals. The suit, filed in the federal district court in Delaware, follows Hazeltine's recent termination of a license it held from RCA under this patent. A similar suit by RCA is pending against Applied Digital Data Systems.

Sofratev in France has formed a U.S. subsidiary to promote the interactive Viewdata system known as the Antiope system. Called Anti-

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## Prime 750 Outperforms IBM 4341 By Factor of Three, Fisher Says

By Connie Winkler

CW Staff

NEW YORK — Prime isn't scared of the 4300. Prime's 750 has been benchmarked against IBM's 4341, and it gets two to three times the performance, according to Kenneth G. Fisher, president of Prime Computer, Inc.

"The unknown was a bigger threat than the known," Fisher recently told the New York Society of Security Analysts. "As the 4300 is better known, we have held up well."

"We believe we have a prod-

uct with the strength to expand up and down and stay competitive," Fisher said, noting that the 750 is also performing well against Digital Equipment Corp.'s VAX-11/780. "We feel we know how to sell the end user."

Prime has to maintain its functionality advantages over the other minicomputer manufacturers and its price advantages over the mainframe manufacturers, the president said.

Prime's secret is in the system's architecture, Fisher

stated. The architecture is similar to that used in Prime's first products in 1975. It consists of a computational utility network that is communications-oriented in an interactive mode — the basis for a distributed data processing system.

"This is just what IBM came out with," Fisher pointed out. Prime's current architecture will hold up for another five to 10 years, Fisher said.

Shipments of the 50 series, of which the 750 is the largest machine, were to begin during the second quarter but have been pushed back to the third quarter. Because of this change in schedule and because Prime opened two new plants this year, second-quarter profits are down.

The plant in Puerto Rico, however, is already beginning to turn a profit and will provide tax benefits toward the company's growing tax burden. The second plant is near the Wellesley, Mass., headquarters.

For 1979, Fisher said he expects per-share earnings of \$1.20 to \$1.30, slightly less than the \$1.35 to \$1.40 analysts projected but approximately the same as in previous years.

### Lease Arrangement

The analysts showed particular enthusiasm for the special lease arrangements with New York's Citibank and Chase Manhattan Bank whereby the banks finance full pay-back, long-term leases directly with the customer. The residual payments go to Prime after three to five years.

Lease customers pay the full list price, Fisher emphasized. Business is good and expanding.

Until now, 90% of Prime's sales have been to users, but the company is stimulating sales to OEMs with discounts on the Prime 450. The 450 goes in multiples of five at \$50,000 each, and the company recently landed a \$10 million OEM sale.



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## Nickels & Dimes

Comdisco, Inc. is making a public offering of 900,000 shares of common stock at \$16.50 per share through an underwriting group managed by Smith Barney, Harris Upham & Co., Inc. and Drexel Burnham Lambert, Inc. The firm plans to use its share of the net proceeds to reduce outstanding indebtedness and to acquire IBM computer equipment for lease, sublease and sale. Comdisco will sell 650,000 shares and certain shareholders, the remaining 250,000.

\$\$\$

Information Displays, Inc. (IDI) sold to five institutional investors \$2 million of 8.5% subordinated convertible debentures due June 1, 1987.

\$\$\$

Cincinnati Milacron, Inc. approved a 2-for-1 common stock split, increasing the number of authorized common shares from 10 million with a \$10 par value to 20 million with a \$5 par value. Distribution will take place on

July 6 of one additional share of common stock for each common share held on June 15. The firm also increased its regular quarterly dividend from 27.5 cents to 32.5 cents per common share.

\$\$\$

To repay bank debt, Magnetic Controls Co. made a public offering of 300,000 shares of its common stock, selling 200,000 shares with the remainder sold by certain shareholders.

\$\$\$

Comten, Inc. shareholders approved the merger of their firm into an NCR Corp. subsidiary through an exchange of stock. Under the agreement, Comten shareholders will receive .38 share of NCR common for each share of Comten common. As a result, about 2.9 million Comten outstanding shares will be converted into approximately 1.1 million NCR common shares, of which 868,000 are currently held by NCR as treasury shares.

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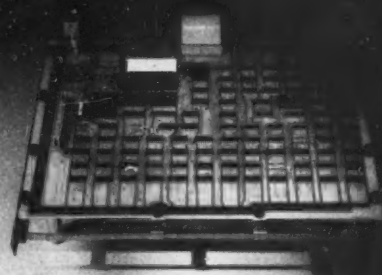
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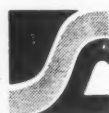
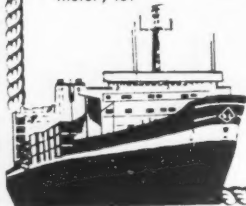
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Our innovative financial systems development group is looking for highly competent Systems professionals to help in the design and implementation of a brand new multi-application system. This effort has strong implications for the future.

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Exclusively employer retained EDP recruiters. All major cities. For information regarding these available positions, send your resume with current salary and geographical preferences to National Headquarters, Data Processing Recruiters, Inc., 322 Groveland Avenue, Minneapolis, Minnesota 55403. For franchise or network partnership information, contact Mr. T.G. Barrett, President.

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C/M of Orlando  
3101 Maguire Boulevard  
Orlando, Florida 32803  
(305) 894-6551

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San Francisco  
\$28K to \$32K

Our client, a large, well known San Francisco based company, has asked us to find individuals with strong technical background who are capable of taking over and managing large in-house manufacturing and cost accounting systems.

The qualified candidates will possess the following background and skills:

- The ability to design and manage development projects.
- Strong leadership and communication skills.
- Effective administrator with strong ROI perspective.

Excellent compensation/benefits packages and relocation are offered.

We are consultants to management. For immediate and confidential consideration, please send resume and salary history to: Rob Graven, Professionals for Computing, Inc., One Maritime Plaza, Suite 1350, San Francisco, Calif. 94111. (415) 956-7120. Employer Assumes Fee.

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Data Processing

## DATA PROCESSORS DENVER OPENINGS

Stearns-Roger has an immediate need to expand its Data Processing force with the following positions.

### MINI-COMPUTER PROGRAMMER

Programmer for Honeywell Level 6 needed. Background is assembler language required. These positions involve data entry applications and operating systems development.

### IBM PROGRAMMERS

We currently have two positions open. One requires three plus years experience with PL/I or COBOL, knowledge of IBM OS/JCL. TSO experience also helpful.

One year IMS experience preferred for our other IBM Programmer position. Three years PL/I or COBOL desired. IBM OS/JCL knowledge required.

### HONEYWELL PROGRAMMER

This position requires three years GCOS/COBOL experience. Knowledge of IDS and manufacturing applications helpful.

### TELECOMMUNICATIONS ANALYST

Must have working knowledge of (and be qualified to select) MODEMS, Network Configuration, IBM Protocols, and more.

In addition, we have openings available in most all disciplines for experienced personnel. For additional information call Jim Cialdella, TOLL FREE 1-800-525-8043, or send resume including salary history in confidence to STEARNS-ROGER, P.O. Box 5888, Denver, CO 80217. We are an Equal Opportunity Employer M/F.



Stearns-Roger

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Excellent opportunity with a major computer manufacturer for an outstanding person with a Doctorate in Computer Science and the interest, ability, and enthusiasm to head up a 100 person group of experts on computer research and advanced technology development.

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## SYSTEMS ANALYSTS AND PROGRAMMER ANALYST ...

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Hanes Knitwear, a leading manufacturer of men's and boys' underwear and printable shirts has openings for Systems Analysts and Programmer Analysts to develop systems for a Honeywell Dual H6660 systems utilizing Time-Sharing, IDS, and TDS.

### SYSTEMS ANALYST-DISTRIBUTION

- to design and install an on-line order entry system. The ideal candidate will have 1-3 years of systems analysis or comparable experience. Knowledge of data base concepts is desirable. A degree is preferred.

### SYSTEMS ANALYST-Sales & Marketing

- to design and install sales and marketing related systems. The ideal candidate will have 1-3 years systems analysis experience. Knowledge of data base concepts is desirable. A degree is preferred.

### PROGRAMMER ANALYST

- to develop and maintain a division wide payroll system including off shore operations. The ideal candidate will have 2-4 years experience with a high interest and in depth knowledge of payroll systems. Knowledge of COBOL and JCL required.

### PROGRAMMER ANALYST

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Manager, Management Employment Dept WC

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Engineer

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Advances in the state-of-the-art of VLSI products will require advances in the state-of-the-art of computer tools. Join the world's IC technology leaders and extend our ability to create high quality, high density VLSI IC designs using computer aided techniques. If you have a PhD in E.E. or Computer Science or equivalent with a background in design automation, particularly in automatic placement and routing techniques, DRC's or space checking, you may be the one we are looking for.

Please send your resume to Joyce Cordi, Intel Corporation, Dept. 27AC, P.O. Box 3078, Santa Clara, CA 95051. An equal opportunity employer m/f/h.

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We are now seeking individuals at all levels to provide computing support to new survey and research projects. Positions are available in the following areas:

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Between 1 and 7 years of programming and/or design experience with knowledge of at least one high-level language. (Trainees with outstanding academic records will be considered); background in survey processing and social policy research and experience with IBM mainframes running under OS or CMS would be a plus.

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**Joanita Badden**

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Data Processing

# INSIDE FAIRCHILD

## Close-up: Senior Methods and Procedures Analyst

Fairchild is seeking a results oriented methods and procedures analyst with a minimum of two years' experience. You will be working and interfacing with the user community as a member of one or more project teams. You must be able to function under the direction of both the Project Team Leader and the Manager, Methods and Procedures.

Your responsibilities shall include all phases of developing, improving and documenting computer input/manual procedures. You will write and provide direction in the development of user manuals. Your strengths should lie in: methods and procedures analysis, systems design and planning procedure writing, communications and leadership.

The successful candidate should hold a Bachelor's Degree or equivalent and a proven success record in the above areas. This position requires manufacturing/marketing or finance experience. A data processing background is helpful.

For immediate consideration, please send a detailed resume to Dana Tueller, Fairchild Corporate Staffing, MS 7-100, 464 Ellis Street, Mountain View, CA 94042.

At Fairchild, we're proud of our efforts as an affirmative action employer and we encourage women, members of minority groups and the handicapped to apply.

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Exceptional career opportunity is now available in Southern California for a leader in the food service industry. This highly visible position will report directly to the President and requires a results-oriented data processing/M.I.S. professional.

Successful applicant will have minimum of 5-7 years of increasingly responsible D.P. experience with demonstrated competence in systems analysis, programming and M.I.S. In addition, must be a strong administrator and have the ability to supervise the work of a staff performing various D.P. functions and capable of interfacing with top management in the development of integrated Management Information Systems.

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Full benefits and educational opportunities. Salary is commensurate with experience. Send your resume to:

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- **PROGRAMMER/ANALYSTS** — responsible for the programming, implementation and maintenance of large and complex systems. 1-5 years experience in COBOL. Retail background preferred.

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"Oxy's MIS plans and programs are exciting and challenging and offer an opportunity for you to be a part of a major diversified energy corporation.

"We are building an environment for professional development for people who are interested in making a commitment, willing to work and looking for good career opportunities. Positions exist in many functions and levels within the systems organization from entry level positions for degreed people to senior management. Applicants will be considered for both Corporate and Division locations.

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E.A. Lustig  
Corporate Director of MIS

### BUSINESS SYSTEMS DEVELOPMENT

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- **Senior Programmer**—minimum 3 years experience

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These positions require self-motivated Control Specialists with management and development experience with big systems, and knowledge in either

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## DATA PROCESSING PROFESSIONALS

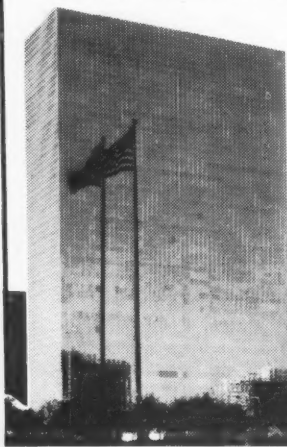
Due to continued rapid growth and expansion, Coastal States Gas Corporation, a dynamic, Houston-based Energy Company, is in need of the following qualified professionals:

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## Coastal States Gas Corporation

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Datapoint has an immediate opening for a senior level individual to initiate and lead an effort to consolidate and analyze corporate requirements for data communications with the goal of developing a plan for nationwide corporate data communications system.

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Ferris State College has an immediate opening for this position. The responsibilities will include both software support, to supplement current support, and applications development. The opening is in our Administrative Computing Department and requires extensive knowledge in systems generations, COBOL, ASSEMBLER and Data Base. Our equipment is a 1 1/2 meg IBM 370/145 running under VM. Send resume and references to: Gordon G. Lewis, Director of Computer Center, Ferris State College, Big Rapids, MI 49307.

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Applicants should have a B.A. plus two years experience in social science computing or the equivalent. Candidates must have the broad range of skills and experience required to develop and maintain applications software and to provide support at several levels for researchers. Attractive salary, plus generous fringe benefits. Send inquiries to: Edmund D. Meyers, Jr., Director of Research Computing, Center for the Study of Youth Development, Boys Town, NE. 68010.

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## Technical Writers Lead Positions in Austin, Texas

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### Computer Software Writers

Coordinate, research and write computer programmer guides, users' manuals, etc. from development data and personal interviews. Must be familiar with operating systems structure and programming languages.

All positions require a college degree (or equivalent experience) and a minimum of 3 years' directly related writing experience. TI offers competitive salaries and a full line of benefits including company-paid relocation.

If you have talent, experience and a keen interest in making the most of your career, we have the challenge and the opportunity for you. Call us now to schedule an interview. Call collect (512) 250-7033 during normal business hours, or send your resume in confidence to: P. O. Box 2909, M.S. 2208/Austin, TX 78769/  
Attn: George Noren.

## TEXAS INSTRUMENTS INCORPORATED

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## PROGRAMMER ANALYST

Immediate opening for a Programmer Analyst with at least 3 years experience in a manufacturing environment. Must have experience with the IBM System 3 and RPG II. Excellent fringe benefit package with opportunity for advancement.

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Personnel Manager  
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Do you want to come to the industrial Southeast? We have immediate openings with the most progressive clients in North Carolina and the Southeast for Systems Analysts & Programmers. Salary ranges to \$30K. If interested send resume or call Continental Personnel, Inc., P.O. Box 11321, Charlotte, NC 28209 (704) 525-2160.

## APPLIED DATA RESEARCH

Princeton, New Jersey

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We are currently embarking on several new projects. The result is an immediate need for a variety of talented and highly motivated data processing professionals.

All positions require two or more years of Assembly language programming experience and a B.S. or M.S. degree in Computer Science or a related field. Relevant experience may be accepted in lieu of a degree.

### • Online Program Development Systems

**Telecommunications Specialist**—Design and implement TP subsystems to support local and remote 3270-type and TTY-compatible devices. Requires expert knowledge of START/STOP and bisync line protocols.

**Compiler/Interpreter Writer**—Participate in development of a new online procedure language. Special emphasis will be placed on a "user friendly" design. Knowledge of compiler writing and error recovery and repair techniques required.

**Software Programmer**—Participate in development of online product under CICS and DATACOM/DC in OS/VS and DOS/VS environments. Familiarity with CICS or DATACOM/DC and knowledge of OS/VS1 or DOS/VS internals highly desirable.

**Software Programmer**—Participate in development of online debugging aids. Knowledge of COBOL essential.

### • DOS/VS/VSE Performance Measurement

Assist in the design and implementation of performance measurement tools for DOS/VS. Requires knowledge of DOS/VS internals. Familiarity with performance measurement preferred.

### • Online Program Generation Systems

Assist in the design and implementation of an online program development/generation system. Requires familiarity with commercial applications, data base concepts and language processors (compilers, interpreters, or query languages). Programming experience with display terminals preferred.

### • Data Management Systems

Lead a team of analysts in the design and implementation of a data management system for online and batch access. The problems you will be addressing include: data security, multi-CPU access, distributed processing and data encryption. Requires knowledge of MVS internals. Knowledge of data base concepts preferred.

### • Source Program Management Systems

Participate in design and implementation of new features and enhancements for one of the industry's best-known software products. Heavy DOS/VS system experience essential.

Call ADR at 609/921-8550 or send your resume, including the position for which you wish to be considered and a complete salary history, to:

DIRECTOR, SOFTWARE PRODUCTS DIVISION



### APPLIED DATA RESEARCH

Route 206 Center, CN-8

Princeton, New Jersey 08540

An equal opportunity employer m/f/h/v

The Navajo Tribal Government, located in rural northeast Arizona is still looking for experienced DP professionals; Systems Analysts and Programmers experienced in Business systems and COBOL required. HP-3000 Data Base experience desirable. Salaries in the 20's. Send resume to Joanne Schmidt; Drawer 644; Window Rock, AZ 86515.

Outstanding opportunities with an Albuquerque, New Mexico-based corporation.

### Manager Financial Accounting

Requires degree in accounting or equivalent experience. CPA or MBA desired, but not necessary. Management experience a must.

### Supervisor of Financial Planning/Budgeting

Prefer BA or BS in Finance/Accounting with experience in planning/budgeting with a major company.

### Programmer

Requires schooling or experience in NEAT/3, COBOL, FORTRAN languages. Working knowledge of key punch. Flexible work schedule with some travel.

### Systems Analyst

Requires schooling or experience in Computer Systems Analysis and Design. Working knowledge of Data Processing, NEAT/3, COBOL, or FORTRAN required. Flexible work schedule and some travel.

Submit resumes to Plateau, Inc. 4445 Indian School Rd., N.E., Suite 113, Attn: Personnel Manager, Albuquerque, New Mexico, 87110. Receipt of resumes will be acknowledged. Plateau is an equal opportunity employer.

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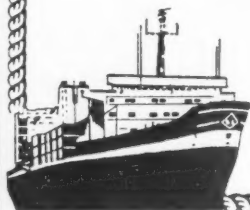
## SYSTEMS SUPPORT ANALYST

The Data Center of Sea-Land Service, Inc., in Elizabeth, N.J., controls a world wide TP network utilizing large scale IBM computers, model 3033 and 158. Our systems support group maintains and enhances our operating systems OS/VS MVS and JES II, in a rapidly growing and challenging environment.

We are looking for a technically oriented individual who wants to work with state-of-the-art software and hardware. Qualifications should include 5 years experience in an IBM environment, OS or VS, with some systems programming experience. We stress initiative and talent, and will provide education.

The position offers a competitive starting salary, comprehensive benefits, and growth opportunity. Please send resume including salary history and requirements in strict confidence to:

L. Barrett, Employment Director



**SEA-LAND  
SERVICE, INC.**

P.O. Box 900  
Edison, New Jersey 08817

Equal Opportunity Employer M/F/Handicapped

## MANAGER SYSTEMS DEVELOPMENT

Los Angeles based, internationally established leader in the entertainment field, has an immediate opening for a Manager-Systems Development.

Candidate will have management involvement and total responsibility for the Systems Analysis & Programming activities of a staff of 20-25 Programmer/Analysts working with a large base of existing applications as well as new systems development using COBOL.

Qualified applicants must possess minimum of 5 years experience ... at least 3 years in a supervisory/management position, have good administrative skills as well as experience in developing and maintaining large business systems. Data Communications and On-Line experience desirable but not necessary. Degree required, preferably in Business or Finance.

Interested candidates should submit resume and salary history to:

CW Box 1986  
797 Washington St.  
Newton, MA 02160

Applications will be held in strict confidence.

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## EDP PROFESSIONALS

We are constantly in touch with many of the Southwest's leading companies and have a constant flow of opportunities available to YOU the professional PROGRAMMER, SYSTEMS ANALYST, EDP AUDITOR, SOFTWARE PROGRAMMER & DATA PROCESSING MANAGER. If you are seeking a new position, we hope you will consider the use of our services. We are proud of our reputation as a leader in the placement of data processing professionals and we constantly endeavor to maintain this reputation.

Give us a call or send a resume today, and let's discuss the many opportunities we have available for you. Fees paid by our client companies.

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Personnel Consultants  
901 Ridglea Bank Bldg., Fort Worth, Texas 76116  
(817) 732-8191

## Administrative position Computer Director

Full time position. Required abilities are:  
1. Supervise small data center staff.  
2. Develop, enhance, and maintain COBOL programs for a small on-line disk computer.

This position will offer an excellent opportunity to be involved in program development and modification. Send resume and salary history.

## Faculty Position

Full time faculty position to begin in September, 1979. Successful candidate must have working knowledge of R.P.G. II, COBOL, and Fortran IV. Knowledge of Burroughs equipment helpful. Enthusiasm about both the subject being taught, and the teaching process itself, are primary considerations. Send resume and salary history.

For both positions apply to:

West Shore  
Community College  
P.O. Box 277  
Scottville, MI 49454  
Attention: David Holland

## PROGRAMMER/ ANALYST

Expanding multi-national manufacturer in Orange County, New York seeks individual experienced in manufacturing to work on NCR advanced equipment; working knowledge of both the Next/3 and Cobol languages is required. Send resumes and salary requirements in confidence to:

Kolmar Laboratories, Inc.  
Personnel Department  
Skyline Drive  
Port Jervis, N.Y. 12771

## Director of Computing Center

The Director has full responsibility for all Administrative data processing in the Downstate Medical Center, including its Teaching Hospital. Responsibility includes the continuing development of an advanced Hospital Information system utilizing on-line terminals throughout the institution. Equipment includes an IBM 370/145-12.

The Director reports directly to the VP for Administration and oversees a DP budget in excess of \$1.2 million per year.

## Qualifications:

Requires a Bachelor's Degree, demonstrated managerial capability, at least 10 years as an information systems professional and good communications skills.

Send Resume and salary requirements to:

Gloria Zulberti, Personnel Director  
Box 53  
State University of New York  
DOWNSTATE MEDICAL CENTER  
450 Clarkson Ave., Brooklyn, N.Y. 11203  
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## DATA PROCESSING

## BEVERLY HILLS CALIFORNIA

Gibraltar Savings & Loan is a major NYSE corporation with assets over \$3 billion. In addition to being one of California's top 10 Savings & Loans, our Information Systems Division features:

**IBM 370/158 and 3033 main frames,  
DOS, OS, MVS, TSO, IMS, DB/DC, CICS  
and new development in COBOL**

Current growth opportunities include:

- **SR. PROGRAMMER ANALYSTS**  
Requires 3-5 yrs. exp. Key role in design implementation & maintenance of new & existing systems.
- **DATA BASE ADMINISTRATORS**  
Requires 3-5 years exp. Design, implement & maintain TOTAL and IMS data bases.
- **SYSTEMS ANALYST SENIOR**  
Requires 3-5 yrs. exp. Design and implementation of major sub-systems including functional and technical design programming, testing and installation.
- **MANAGER COMPUTER OPERATIONS**  
Requires 3-5 yrs. exp. in multi CPU environment and the ability to function in a 7 day shop. Savings & Loan exp. preferred. Reports to VP Computer Services.

5 & L experience strongly preferred for all of the above positions.

For immediate consideration CALL COLLECT OR WRITE:

Wayne Burditt



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## HOUSTON OPENINGS

Project Leaders: 7 yrs. exp., IBM/COBOL . . . 29-35K  
Sr. S.A. 3-5 yrs. exp., IBM/COBOL . . . 27-32K  
Systems Analyst: 1-2 yrs. exp., IBM/COBOL . . . 22-27K

## Technical Writers Field Engineers Systems Analysts Sr. Electronic Technicians

NCR/Columbia, South Carolina, designs, develops and manufactures microcomputer and data communications products and systems. We are currently seeking Technical Writers for the production of software, hardware and operator publications. Duties include preparation of complete manuscripts on operating systems, software drivers, hardware modules, maintenance procedures, operating procedures, and installation documents on hardware and software products.

If you have not had prior experience in technical writing but have functioned as a Field Engineer, Systems Analyst, or Senior Electronic Technician and have a desire to be a Technical Writer, please send resume and salary history to: Mr. Ken Uhlig, Engineering and Manufacturing, NCR Corporation, Dept. L50, 3325 Platt Springs Road, West Columbia, S.C. 29169

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Writing  
Positions are  
available at  
NCR/  
South  
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## Architect Systems Analyst Programmer

### An opportunity to join NCR/San Diego's New Systems Engineering Group

NCR is further strengthening one of the most able teams that's ever pioneered systems development.

This newly created division at Scripps Ranch, San Diego will be shaping an entire new generation of interactive, transaction-oriented distributed processing systems for the 80's.

#### Systems Architect

You will make technical and strategic decisions having a critical impact on the future of the world's second largest computer company. Will contribute to determine next generation NCR mainframes, minis and micros; and determine architectures that optimize latest VLSI and software concepts. If you are innovative, knowledgeable of the state-of-the-art, and able to think in terms of total systems, we offer greater freedom than you've ever had before. Preferred experience: open-ended multi-processing; distributed processing; network architecture; distributed data bases; transaction and interactive processing.

#### Systems Analyst/Programmer

You will be part of a small group designing and implementing advanced system software for the I-8400 family and future mainframes. These systems will support interactive multiprogramming environment with virtual memory capability. Programs are written entirely in high-level, Pascal-based language. We seek experience in, or exposure to operating systems development, compiler construction, firmware development; and high-level, block-structured software.

### San Diego Lifestyle

NCR's pioneer development group is located in Scripps Ranch, 15 miles up the coast from San Diego. We'll give you a working and living environment that's the envy of the EDP industry.

#### Interviews arranged quickly

For a high level review of your qualifications, and a prompt in-depth briefing on your future at NCR, send confidential resume and salary history at once to, or call collect (714) 485-2183, Mr. Frank Ordek, Manager, Personnel Resources, Dept. L50, NCR Corporation, Systems Engineering, 16550 W. Bernardo Drive, San Diego, CA. 92127 Mailstop 5000.

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Complete Computer Systems

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### COME TO BEAUTIFUL NEW MEXICO

Where excellent career opportunities complement the excellent style of living in Albuquerque, New Mexico.

Public Service Company of New Mexico has put together a state-of-the-art shop based on an IBM 3031 running MVS, DL/I, CICS, TSO/SPF. This system is up and running and NOW is your chance to get in on the ground floor of a rapidly expanding on-line environment.

As our company has tripled in size within the last decade, the following outstanding career opportunities have opened for dedicated professionals.

#### Data Base Specialist

This position requires strong OS/VS knowledge including IMS, VSAM experience. Duties will include support of IMS/VS DB, IBM DB/DC Data Dictionary, CICS and DL/I interface, data base backup, recovery and organization, and productivity aids. Salary \$16,000 to \$26,000.

#### Programmers/Analysts

• Top quality Fortran or COBOL required for new Systems Development • One to four years experience required.

#### Systems Analysts

• Experienced Analysts required for challenging assignments in specifying Business and Engineering Systems.

Please send resumes to the attention of Mike Kraft:

PERSONNEL

PUBLIC SERVICE COMPANY OF NEW MEXICO

Post Office Box 2267  
Albuquerque, NM 87103

An Equal Opportunity Employer M/F

## SYSTEMS DESIGNERS—MATERIALS SUPPLY

### Join Aramco for challenging jobs, travel opportunities, family benefits, up to 40% premium.

Lots more money. Unique professional experience. Excellent career advancement opportunities. Long vacations. Once-in-a-lifetime travel. Outstanding schools for your kids. This is what Aramco offers you right now.

Read how you and your family can benefit as you help Aramco develop the energy resources of Saudi Arabia.

Aramco, the world's largest oil-producing company, is also the key firm involved in the development of the energy resources of Saudi Arabia.

Some of the projects are the world's biggest, and the amount of supplies and materials purchased, processed, warehoused and distributed by our Materials Supply Service staggers the imagination (120,000 different items valued at approximately \$300,000,000).

Top-notch materials systems designers who really know all the ins and outs of materials supply management on a massive scale are needed in Saudi Arabia. In exchange, Aramco offers many attractive benefits. Up to 40% tax-protected premium, 40 days' paid vacation every 12½ months. Good family living conditions. Excellent education for children. Good career advancement opportunities. And for those who enjoy travel, the famous sites of Europe, Asia and Africa are within reasonable distance. You may be right for these jobs.

#### If you have the talent, we have the jobs

You must have in-depth knowledge of materials supply systems, policies and procedures concerning: methods of inventory investment control; determination of requirements; receiving, storing, issuing, reclamation

and disposal of obsolete materials. Plus utilization of surplus materials, physical inventory, control documentation and record keeping.

You can expect to quarterback the preparation of plans and proposals for EDP application, and work with the Electronic Data Processing Division developing controls and schedules for EDP input and output data.

In one sentence—you are going to be involved in all the studies and procedures designed to effectively manage the entire 120,000-item inventory for Aramco.

#### Overseas experience helpful

We'll be eager to talk to you if you have at least 10 years' diversified experience, all or some of it overseas, in materials supply management, economics and systems design or management. Military, government or big corporation experience very helpful. EDP experience would be an asset, too.

If your experience is less, say 8 years in materials supply management, we still want to talk to you. And if your experience is only 2 years, but your degree is in a fully accredited computer science major, you could start with us assisting in systems development.

**Interested?** Opportunities like these don't come along every day—to earn up to 40% tax-protected premium; to have so much paid vacation; and to have so many travel opportunities and family benefits.

Why not call Jon Calloway right now for more information?

Call toll-free: 1-800-231-7577, ext. 4156. In Texas, call collect: (713) 651-4156. Or send your resume in confidence to Aramco Services Company, Department CW070279JWCB, 1100 Milam Building, Houston, Texas 77002.

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Proj-OS	.....	18-22K
Proj-AIC	.....	18-22K
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Proj-Sys/3, RPGII	.....	18-22K
Proj-Fortran	.....	17-22K

If you are interested in relocating to the SOUTHWESTERN area, please call JIM FLEMING collect at 713-961-3271 or send your resume to:

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4801 Woodway, Ste 231W  
Houston, TX 77056

### Data Processing Professionals Visiting

## CALIFORNIA?

Consider your career on your next vacation or business trip to California. We hope we don't have to sell you on the weather, the recreational opportunities, or the pleasant style of living. We would like to tell you about the excellent opportunities for career growth here.

The phenomenal growth of the electronics industry based in Sunnyvale/San Jose/Palo Alto (Silicon Gulch) is just one of the many reasons that demand for competent data processing people far exceeds the supply, throughout the state.

If you are serious about your career and would like to live where you vacation, contact us. We are data processing professionals, averaging eleven years in DP, who have gained a reputation for integrity in placement. We can help you evaluate your career options and get the position that will help you reach your objectives. Employers assume all of our fees. Call or write.



## Systems Careers

50 California Street  
San Francisco, CA 94111  
(415) 434-4770

510 Lawrence Expressway  
Sunnyvale, CA 94086  
(408) 737-9110

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## Director, Computer Systems

If you're looking for the top computer job in a dynamic environment, look no further.

We are an innovative transportation company headquartered in San Francisco and we need an experienced executive to direct all facets of our computer systems and services. The new director will report to the Senior Vice President level.

MBA or equivalent plus 10-15 years of progressively responsible experience in data processing is required. Must have good verbal and written communications skills.

Equally important is the ability to set challenging objectives and to attain them in a timely and cost effective manner. Applicant must have demonstrated general management skills in managing professional, technical and clerical staffs and in dealing effectively with user divisions. Recent experience with medium or large scale IBM 370 Hardware and Software systems highly desirable.

Our location, working conditions and employee benefits are highly attractive and the salary offered is in the mid-fifties. Achievement is rewarded in our company and personal growth is encouraged.

Please send your resume and salary requirements to Box G-1086, 120 Second Street, San Francisco, CA 94105.

An equal opportunity employer.

## MANAGER

### Systems and Programming

The Cincinnati Health Department is recruiting for a management level position responsible for supervision of analysts and programmers performing design and development of new application software. This is a newly established position with considerable visibility and responsibility in a growing Information Systems Division.

Requirements include demonstrated success in data processing supervision and/or project management, and systems analysis and design. Also extensive COBOL and on-line processing experience on third generation (or equivalent) systems.

Excellent fringe benefits and very competitive salary range from \$25,000 to \$32,000. Please send resume and salary history to: Tom Gonnell, 3101 Burnet Avenue, Cincinnati, Ohio, 45229.

## SYSTEMS PROGRAMMER

Experience required with one or more of the following:

OS/VS VM SYSGEN - SMP  
NASP/JES Internals  
Performance Tuning  
ROSCOE/WYLBUR/3705 Maintenance  
We offer meaningful employment in a rural northern New York location. Our employees are encouraged to enter Bachelors, Masters and Doctoral degree programs. A new computer will be installed when construction on our new facility is concluded. Please send resume including salary requirements to:

Kurt M. LeBesque  
Clarkson College  
Computing Center  
Potsdam, NY 13676

Equal Opportunity/Affirmative Action Employer

## Data Base Product Development

We are looking for product development specialists: do you like to see the whole picture, enjoy describing the system to others? Are you good at interfacing with a host of different specialties: product marketing, technical writing, system programming, quality assurance? Or are you a technical writer a bit frustrated because you're removed from where the action is? If you have some systems or applications programming experience, excellent communications skills, take pride in writing good technical documentation, are good with people and learn quickly, we have a proposition for you. To find out more please send your resume with salary history to Elaine Rosenberg, Wang Laboratories, Inc., One Industrial Avenue, Lowell, MA 01851.

We are an affirmative action employer

## Computers

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## Word Processing

## SYSTEMS PROGRAMMERS

Data Processing Systems Programmers needed to work with new system software development projects for a multi-campus University Computer Center. Minimum experience, 2 years of system programming with strong background in one or more of the following: MVS, VM, JES2, CICS/VS, IMS/VS, TCAM, VTAM, NCP or teleprocessing hardware/software.

The environment is an 8-Meg 370/168-MVS. Position carries 5 weeks vacation per year. Salary open.

Starting date after August 1, 1979; closing date for receipt of resumes (include salary history) July 16, 1979. Send resumes to:

Richard Godfrey  
UNIVERSITY OF ILLINOIS  
Room 370 RRB  
P.O. Box 4348  
Chicago, Illinois 60680

The University of Illinois is an Affirmative Action/Equal Opportunity Employer.

## DIRECTOR DATA PROCESSING

We are seeking a qualified individual to plan, direct, and coordinate all data processing activities for a major south-western teaching hospital. Applicants should have a bachelors degree in business administration, computer sciences, or a related field and a minimum of five years experience in the field of data processing. A proven track record in management is required. Prior hospital data processing experience is a plus.

The successful candidate will manage a staff of thirty and be responsible for the development and installation of a comprehensive hospital management information system. We offer excellent benefits. Salary is open based on experience. Send resume and salary history in confidence to:

CW Box 1978  
797 Washington St.  
Newton, MA 02160

An Equal Opportunity Employer

## DIRECTOR COMPUTING FACILITIES

### University of Michigan-Flint

Applications are invited for the position of Director of Computer Facilities at The University of Michigan-Flint. Applicants should have an M.S. degree in Computer Science or closely related field, experience in university computing centers (both academic and administrative) and management experience. The position includes budgetary responsibility and long range planning and development for the areas of academic and administrative computing. Present hardware includes: Harris 1200 RJE communicating with an Amdahl 470/V7, Four Phase RJE communicating with an IBM 370/158, and many timesharing terminals throughout the campus. The Computer Science Department owns a Burroughs B1800 which is maintained by the academic computing center. The University is selecting a mid-size computer for administrative use.

UM-Flint, a branch of The University of Michigan is dedicated to maintaining a distinguished educational program.

Persons interested in this position should send a resume and the names of three current references to:

Professor Nancy Martin  
c/o Provost Office  
University of Michigan-Flint  
Flint, Michigan 48503

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ALL LEVELS of Computer Personnel Needed - Call or write to: ABC PERSONNEL, INC., Box 911, Elkhart, IN 46515. (219) 293-0596. Prompt, Confidential Reply. A personalized, nationwide, licensed employment agency. ALL FEES PAID.

## SYSTEMS PROGRAMMER

Attractive career opportunity technically oriented professional. 3+ years BAL systems programming with experience in OS and DOS. Aid in conversion from dual 370/145 to dual 3032. Develop both analytical and technical skills in this senior level position. \$28,000. Call MARTY AMATO

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522 Fifth Avenue  
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(212) 221-6500

## ASSOCIATE MANAGER SYSTEMS AND DEVELOPMENT

Direct the activities in relation to the computer operating systems: TOPS-10, RS/11, VM/370, OS/VS1, DOS/VS and software systems: DBMS-10 etc. and the development of transaction processor and communications network. A Master's degree in Computer Science or a related field and four to five years experience in programming, operating system digital data communications including planning and supervision. Salary range \$18,760 - \$27,970 based on education and experience. Submit resume by July 15, 1979. University of Louisville, Personnel Services, 2323 South Brook Street, Louisville, Kentucky 40208. Telephone: 502-588-6551.

An Equal Opportunity/Affirmative Action Employer

## COMPUTER CENTER DIRECTOR

Austin College in Sherman, Texas, 65 miles north of Dallas, will appoint by Fall 1979 an individual to direct its central computer facility which includes five other staff members. Teaching one course each term in the College's computer science program will be a part of responsibilities. College's computer system is a 200 k-byte Interdata 7/32 computer with three 40 mega-byte disc drives, one 1600 B.P.I. 9-track tape drive, 600 L.P.M. line printer, 1000 C.P.M. card reader, Decision data card read-punch, and multiple terminals B.A. degree required, with an M.A. or doctorate desirable; should also have had several years background and experience appropriate to position of this type and training in COBOL and FORTRAN. Salary open, depending on background. Send letters of recommendation and resume to: Dr. Don Bedsole, Dean of the Faculty, Austin College, Sherman, Texas 75090. An Equal Opportunity Employer.

## PROGRAMMER/ANALYSTS, NCR/Neat 3

Call us this week for details . . .  
(716) 262-6498

Data Center of a dynamic and progressive upstate New York Financial institution is seeking individuals with a strong Neat 3 background. Banking and/or C/F background would be helpful.

In addition to a salary fully commensurate with experience, we offer a liberal fringe benefits package and solid opportunity for long-term professional growth. For consideration, call us or send detailed resume and salary history to:

Emily Hancosky, Personnel Officer,  
(716) 262-6498  
CITIBANK, 28 E. Main St., Rochester, NY 14614

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## Sales Promotion Manager

### Business Publication

Information Processing/Office Products Markets

Wanted: experienced sales promotion manager by long-established major national publishing company, for leading business publications in computer-office products markets. Computer/EDP industry background preferable.

Job requires experience in planning, developing and producing full schedule of materials to help promote the sale of top page rate advertising space in multi-million dollar annual range.

Skills needed include conception, writing, production, scheduling and follow-through on complete range of publication advertisements, direct mail, media salesmen sales materials, newsletters, publicity releases, merchandising and seminar marketing.

Responsibilities include directing activities of advertising agency, public relations firm, and exhibit services company.

In-house facilities include art, typesetting, printing production, word processing, mailing and data processing services.

Western Chicago suburban location. Competitive salary commensurate with experience. Comprehensive fringe benefits, including paid vacations, paid holidays, company bonus and retirement program. Immediate opening.

Send resume, including salary history, to:

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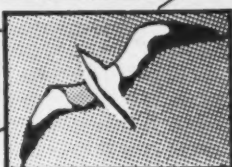
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Methods Analyst 18-24K  
-EDP Trainers 20-27K  
-Quality Assurance Analysts 18-25K

Please call or send an up to date resume to:

Mrs. Linda M. Heidenis

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Holyoke Water Power Company  
Northeast Utilities Service Company  
Northeast Nuclear Energy Company

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## TELECOMMUNICATIONS ANALYSTS

Security Pacific National Bank has immediate openings for a Telecommunications Analyst and a Telecommunications Systems Engineer in our Headquarters in Los Angeles.

The Analyst will design, implement and maintain telecommunications systems for branch office and administrative locations. Working knowledge of PABX, CENTREX, ACD, intercity services, private tandem trunks and tariffs is required.

The Systems Engineer will assist in the design, implementation and maintenance of data communications networks and facilities. This individual should have an understanding of voice telecommunications and a working knowledge of data communications equipment such as modems, multiplexer/concentrators, data test sets and proficient in analyzing multidrop, multinode networks and teleprocessing protocols. Some previous involvement with international communications is desirable.

Excellent benefits and growth opportunities. Send resume and salary history to:

L.C.H. 5  
611 No. Brand Blvd.  
Glendale, CA 91203



SECURITY PACIFIC BANK  
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## SYSTEMS ANALYST

Diversified Cleveland company requires experienced Systems Analyst for its corporate headquarters. Successful candidate must have degree, with major in Accounting, or related financial area. Will consider one to three years' experience in systems work, with a financial or accounting background. Will be responsible for systems analysis for major division of the company Liberal benefit program. Please send resume and salary requirements to: CW Box 1981, 797 Washington St., Newton, MA 02160

## the answer is clear.



Clear Lake, that is. If you'd rather be sailing, fishing, boating, or skiing, then you should be working for Ford Aerospace and Communications Corporation. We're located in the Clear Lake area, situated by Galveston Bay, just 25 miles from the Gulf of Mexico, known for excellent deep sea fishing. Around the lake there are numerous marinas and yacht basins that distinguish the area as the boating mecca of the Gulf Coast. And we're a comfortable distance from the big city—just 30 minutes from downtown Houston.

Our career opportunities are equally attractive. As a leader in custom data processing systems for large-scale ground-based communications, command and control applications, we have immediate openings from entry level to senior level in the following areas:

**SYSTEMS PROGRAMMING:** Requires OS internals experience on micro, mini, or large scale computer systems. Design and implementation of I/O drivers, systems enhancement and system utilities is a plus.

**APPLICATION PROGRAMMING:** Will be required to design, code, verify, and document assembly language or Fortran programs for a real time system. Telecommunication and/or process control experience is a definite asset.

**APPLICATION PROGRAMMING:** Analysis in programming experience on aircraft and digital avionics systems. Assembly language programming on mini-computers desirable.

Additionally, we have immediate openings for experienced digital design, analog design, minicomputer systems ENGINEERS and electronic TECHNICIANS for long term assignments in our Space Shuttle programs.

We can offer highly competitive salaries and an outstanding benefits package, as well as excellent opportunities for advancement. What's more, Texas doesn't have a state income tax. So if you're looking for a career opportunity that won't interfere with your fishing, or if you want to get away from the big city for more than just a weekend, the answer is clear...Ford Aerospace & Communications Corporation. For more information CALL COLLECT or send a resume to Mr. John Brown, Space Information Systems Operation, P.O. Box 58487, Houston, Texas, 77058, (713) 488-2783.



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- 2) CICS COBOL/Assembler/PL-1
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These positions are for Dallas, Atlanta, Houston, Phoenix, San Francisco, and some cities of 100,000. Please send a resume or letter of interest. We will return pertinent information on your geographic preferences.

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Please send resume or call:

Norman A. Rich  
Systems Analyst Manager  
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All replies will be held in strict confidence

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SUITE 100  
1211 NORTH WESTSHORE BOULEVARD  
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(813) 872-1853

### SUNBELT OPPORTUNITIES for MIS PROFESSIONALS

Corporate Business Systems, Inc., specialists in the placement of professional Data Processors, has recently expanded its operations to Fort Lauderdale, Florida. We welcome the top-level individual who is contemplating a move to the southeast, to contact us for immediate consideration on the following career opportunities:

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**CORPORATE BUSINESS SYSTEMS, INC.**  
**Ronald Yen, Manager; EDP Recruitment**  
1 First Nat'l Plaza, Suite 810  
Dayton, OH 45402 — (513) 222-2525  
or John Jorge, EDP Recruitment  
3075 W. Oakland Park Blvd. Suite 203  
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Faculty position available in Associate and Assistant Professor levels to teach undergraduate courses in COBOL Programming, Systems Analysis and Business Applications.

Candidates must have a Master of Science degree with a minimum of three years industrial experience in computing. Please send resume to:

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Contact Dr. Kimball Marshall, Chair of Search Committee, c/o Office of the Vice President for Business and Administrative Services, Sangamon State University, Shepherd Road, Springfield, Illinois 62708. The deadline for applications is July 31, 1979.

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Positions available include teaching position in Information Systems. Courses taught could include COBOL, PLI, Systems Analysis and Design, Project Management.

An additional position is open in the Rehabilitation Program in Data Processing. RPOD, an auxiliary program designed to provide training in computer programming for handicapped adults. Excellent working knowledge of COBOL essential. Experience with IBM 370 software is preferred for this position.

We would consider a joint appointment in Information Systems and RPOD for the person with the right qualifications & motivation. Excellent fringe benefits, salary commensurate with experience. Please contact:

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Largest distributor of turnkey DEC computers in the Northwest seeks experienced programmers, analysts and project leaders.

Requires solid data processing background with experience in accounting and/or distributor applications preferred.

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Using a combination of individual attention from professional counselors with the hi-speed efficiency of computer technology, your resume is reviewed, coded and put into our computer's memory system. There, it is continuously checked by companies seeking persons with your qualifications. Your counselor will advise you when a "match" occurs, but you are under no obligation to interview if you are not interested. Your identity remains a coded secret until an interview is mutually agreed upon.

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# Programmer Analyst

Dow Jones & Co., Inc. publisher of the Wall Street Journal located in Princeton, New Jersey area seeks Programmer/Analysts. The individuals selected for these positions will be responsible for the development of detailed plans, programs & procedures in the areas of Payroll/Personnel Systems and other business applications. Experience in these areas would be preferred.

Applicants should have knowledge of IBM 370/138 and 148 Systems, COBOL and DOS/VS. DL-1 and/or CICS/VS would be helpful.

Excellent company benefits including educational reimbursement. Please send resume including salary history in confidence to:

**EMPLOYMENT MANAGER DOW JONES & COMPANY**

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**The Wall Street Journal**

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This is an excellent career opportunity for a high-potential individual with experience in systems programming to work at our Long Island headquarters.

Candidate should be degreed and have 3-5 years experience in a 3033 environment, with in-depth systems programming experience in any of the following areas: MVS/JES2, VM/CMS, IMS.

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Assist faculty in the development of CAI, interactive graphics, and special computerized instructional packages, document software, develop and present seminars for faculty and students; assist academic community in special research projects. **Qualifications:** Bachelor's degree Master's desirable; in computer science or math. 2-3 years extensive programming experience in a large IBM OS shop and/or a large mini operation. **Languages:** Fortran, APL, C, Assembler, and Basic. Deadline for applications is July 20, 1979. Send letter of application, complete resume, and salary history to:

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**SUNY College of Tech.,**  
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Immediate opportunity with U.S. Senate Center for programmer/analyst to assist in development and maintenance of a complex on-line financial management system. Working experience with CICS and ALC required. COBOL, MVS, M204 or other DBMS experience helpful. Salary negotiable. Send resume with salary history to:

**Manager,**  
**Administration Applications**  
**U.S. Senate Computer Center**  
400 N. Capitol NW  
Washington, D.C. 20510

### Medical Systems Programmer Mississippi State University

Mississippi State University has an opening for a systems programmer to monitor development by a contractor of a accounting and medical records system on a minicomputer for the College of Veterinary Medicine, and to maintain the software system.

Applicant should have 2-3 years experience as a system programmer, preferably in the medical area, and should have minicomputer experience.

The salary is open. Address application to:

**Wm. Edwin Ellis, Head**  
**Computer Center**  
**Drawer CC**  
**Mississippi State, MS 39762**  
*Mississippi State Univ.*  
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Leading NCR software development organization is seeking individuals with NCR and a minimum of 1 year COBOL or NEAT/3 experience to work on state of the art software tools (current project include TP monitor, DBMS and interactive language). Good growth opportunity, salary open. Send Resume to:

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J. C. Dayvaoli, President

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1211 N. Westshore Blvd., Suite 107  
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Bausch & Lomb, a leader in the manufacture of quality consumer products and scientific instruments, is currently seeking candidates to fill a new position in one of our major divisions, located in Rochester, New York. Candidates must possess a BS degree in Computer Science or Accounting and a minimum of five years' experience in a manufacturing environment. Ideally, professional experience would have included the elements of standard cost accounting related to the manufacturing and assembling of scientific optical products.

Reporting directly to the Division Controller, overall responsibilities will include the coordination and development of manufacturing-related systems. Prior experience with work-in-process and material requirements planning (MRP) systems is considered essential.

If a position that offers high visibility and growth potential, while contributing to the overall effectiveness of a major division of a \$440 million corporation meets with your career objectives, we'd like to hear from you. Please forward your resume, including salary history, in confidence, to:

**Mr. Donald W. Lewis,**  
**Senior Corporate Recruiter**

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\$19,184.56 — \$23,894.80 annually. Any comb equiv to masters degree in computer science or public admin and 5 yrs responsible supervisory exp in computer system development and operations or closely related field. Applications accepted until position filled. Apply to City of Savannah Personnel Office, 10E Bay St., Savannah, GA, an equal opportunity employer.

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RAPIDLY EXPANDING East Coast Firm seeks PROVEN DP PROFESSIONAL who would thrive in a DYNAMIC & CHALLENGING environment. Solid COBOL bkgd on Igo Scale IBM OS. Assembler &/or CICS+. Work w/clients on a long & short term basis. Position offers UNLIMITED GROWTH POTENTIAL.

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Ohio University is seeking an experienced professional to direct computer operations and systems programming functions of the University Computer Center

Major Responsibilities are to maintain an efficient and dependable computer operation, maximize computer throughput, supervise operations and systems programming staff and provide technical advice and support to other elements of the department

Qualifications include degree plus 5 years experience in computer operations and/or systems programming or equivalent, knowledge of IBM operating systems and utilities salary range \$20,000 to \$23,000 depending on qualifications and experience send resume to Alden Daizell, Director of Computer Services, Ohio University; Haring Hall, Athens, Ohio 45701. Equal Opportunity Affirmative Action Employer.

### Applied Technology Supervisor

FLORIDA

SALARY \$15K - \$20K

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**REQUIREMENTS:** College degree and 3 years experience in systems analysis and programming. Experience may be substituted on a year-for-year basis for required college. Burroughs B6700/B7800 experience a plus. Selected candidate will be responsible for continuous review of the overall performance of a highly complex computer system.

Send resume to: P.C. Smith, Computer Services Administrator, Department of Health & Rehabilitative Services, P.O. Box 2016, Jacksonville, FL 32203. #1 39734



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<p><b>JOB VACANCY</b></p> <p><b>COBOL PROGRAMMER</b> <b>LIBERAL ARTS COLLEGE</b></p> <p>Immediate opening for programmer with four (4) year degree and experience. Will develop and maintain application software in student records or financial system for state college using on-site HP3000 system. Salary \$15,000. Resume including educational background, employment record, and references should be received by July 9, 1979.</p> <p><b>WRITE:</b> Director of Institutional Research, Mary Washington College, Fredericksburg, Virginia 22401.</p> <p>(703) 373-7250, ext. 230</p> <p>An Equal Opportunity Employer</p>	<p><b>Inflation ... Beat it in Dallas</b></p> <p>Make your move to Dallas or to other key locations now and improve your earnings! We'll help you with a free marketability test along with contacts with key people. Or, we'll show you how to do it yourself, at no charge.</p> <p>Send us your job and salary requirements along with your resume today.</p> <p>Search Specialists \$18,000 to \$60,000</p> <p><b>FURST ETHINGTON LTD.</b> P.O. Box 401629 • Dallas, Texas 75240</p> <p><b>OPERATIONS SUPERVISOR</b></p> <p><b>DATA PROCESSING</b></p> <p>This growing corporation has an immediate opening in the Data Processing Dept. for an Operations Supervisor. Individual should have System 3 Model 15 experience. CCP and RPG programming experience a definite plus. Work location — Paoli area. Company pays entire cost of extensive fringe benefit package. Qualified applicants please send resume including salary history in confidence to:</p> <p><b>Z-64, P.O. BOX 2063</b> <b>Philadelphia, Pa. 19103</b></p> <p>Equal Opportunity Employer M/F</p>	<p><b>SYSTEMS ENGINEER ANALYST/PROGRAMMER</b></p> <p>Immediate openings exist for all levels providing a challenging career in the design and development of computer controlled systems for automated material handling applications using minicomputers, microprocessors, programmable controllers and other distributed processing techniques.</p> <p>Experience in process control, data processing, on-line/real-time systems and material handling applications; GA and DEC minis; CONTROL and RSX-11 OS; are a plus.</p> <p>Requirements are BS or MS in computer science or engineering, math, business with minor computer science, 1-6 years experience in computer related fields and a good knowledge of FORTRAN.</p> <p>Send resume with salary history and requirements to R. P. Dentner, Director Employee Relations, Heico Inc., S. 14th Avenue, Mendota, Illinois 61342.</p> <p><b>HOUSTON OPENINGS</b></p> <p>Career Consultants specializes in relocating DP professionals in Houston where the job market is "wide open" and living conditions excellent! Great weather, too! Immediate openings in the following areas:</p> <ul style="list-style-type: none"> <li>*COBOL, ALC, PL-1, RPG &amp; FORTRAN Programmers</li> <li>*SR. Commercial Programmers/Analysts/Project Leaders</li> <li>*SR. Scientific Programmers/Analysts</li> <li>*Mini Computer/Real-Time Programmers</li> <li>*Systems Specialist &amp; Data Base Professionals</li> <li>*EW "Crews" Analyst/Programmer</li> </ul> <p>Call Collect or Mail Resume Today! We provide complete information concerning employment opportunities in Houston and an exclusive Salary Survey of over 180 Houston companies!</p> <p><b>CAREER CONSULTANTS</b> Suite 2222, 2000 S. Post Oak Houston, TX 77056 713/626-4100 Member National Computer Associates</p>	<p><b>CMI BUY LINES</b></p> <p><b>BUY-SELL-LEASE-TRADE</b> call Toll-Free <b>1-800-521-9648</b></p>													
<p><b>PROGRAMMER ANALYST</b></p> <p>Biomedical research institution installing large HP3000 system is seeking individual with 3 years FORTRAN and COBOL experience. Salary commensurate with experience. Please forward resume and salary history to Personnel Manager, Southwest Foundation for Research and Education, P.O. Box 28147, San Antonio, Texas 78284</p> <p>Equal opportunity/Affirmative Action Employer</p>	<p><b>Programmers/Supervisor</b></p> <p>Town of Arlington. Responsibilities include writing programs for NCR Century 101 computer, assisting in determining feasibility of applications and supervision of small staff. One to three years experience programming in Cobol or Fort/3 with supervisory and operations experience desired. Two positions, one 1st shift programmer and one 2nd shift programmer/supervisor (some flexibility in hours possible). Salary range \$12,878 to \$15,967. Please submit resume to: Mrs. Stevens, Acting Personnel Director, Personnel Board, 7 Central St., Arlington, MA 02174 An equal opportunity employer.</p>	<p><b>BUY SELL SWAP</b></p>	<table border="1"> <tr> <td>370/168 370/165 Market Information Bob VanHellemont or your CMI Account Manager</td> <td>370/158 Ron Baker</td> <td>370/155 Dave Shellenbarger</td> </tr> <tr> <td>370/148 370/138 Pam Hoban</td> <td>370/145 370/135 370/125 370/115 CDC-OMEGA Bob Southwell</td> <td>3830 3803 3350 3420 3333 3411 3330 3203 3340 3211 Darryl Hastings Pat Callahan</td> </tr> <tr> <td>1403 2821 2540 2501 1443 1442 Joe Romeo</td> <td>360 30, 40, 50, 65 Best of Values Joe Romeo</td> <td>3270 CRT's With Any Model Keyboards Printers/Controllers Available Immediately Dorothy Trombley</td> </tr> <tr> <td>SYSTEM/3 Model 15 &amp; 12 Jerry Roberts</td> <td>SYSTEM 34's Available Denny Pennington</td> <td>360/20 1130 Marie Bednarz</td> </tr> </table>		370/168 370/165 Market Information Bob VanHellemont or your CMI Account Manager	370/158 Ron Baker	370/155 Dave Shellenbarger	370/148 370/138 Pam Hoban	370/145 370/135 370/125 370/115 CDC-OMEGA Bob Southwell	3830 3803 3350 3420 3333 3411 3330 3203 3340 3211 Darryl Hastings Pat Callahan	1403 2821 2540 2501 1443 1442 Joe Romeo	360 30, 40, 50, 65 Best of Values Joe Romeo	3270 CRT's With Any Model Keyboards Printers/Controllers Available Immediately Dorothy Trombley	SYSTEM/3 Model 15 & 12 Jerry Roberts	SYSTEM 34's Available Denny Pennington	360/20 1130 Marie Bednarz
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<p><b>NCR</b></p> <p>Prog 1 yr NEAT/3 ..... 12-17 ON-LINE ..... 14-19 CIF ..... 16-26 Banking ..... 16-28 Health Care ..... 15-20 TOTAL ..... 18-26 Sys Anal ..... 19-23 DP Mgr-Banking ..... 18-24 DP Mgr-Mfg ..... 20-24 NEAT/3 Level II ..... 13-24</p> <p>Anderson-Mc Intyre 106 Uptain Bldg Chattanooga, TN 37411 (615) 894-9571</p>	<p><b>ANALYST PROGRAMMER</b></p> <p>Firm located in Washington, D.C. has immediate opening for a career oriented individual to interview users design and implement new applications for an in-house time-sharing system.</p> <p>Must have college degree and at least 2 years experience in systems development using high level language. Excellent salary and benefits. Please send resume including salary requirements to: CW BOX 1984, 797 WASHINGTON ST., NEWTON, MA 02160</p> <p>Equal Opportunity Employer</p>	<p><b>BUY OF THE WEEK</b></p> <table border="1"> <tr> <td>For Lease (2) 370/168's for June/July Special 2 &amp; 3 Year Rates 370/168 Attached Processor Available June 14 Megabytes Memory IBM &amp; OEM Various increments</td> <td>370/158 Model 3 with ISC Available July Ron Baker</td> <td>3155-J2 Serial #10206 Dated w/2 Megs CMI Memory Available Now</td> </tr> <tr> <td>WANTED! Any 133/148 For Delivery within 90 Days</td> <td>360/65 1/2 Meg. — 3 Channel High Speed I/O Set Tape &amp; Disk Available Now Lease and/or Purchase Joe Romeo</td> <td>3277-02 with: 4631 or 4633 Available 30 Days Controllers also Available Kay Richard</td> </tr> </table>		For Lease (2) 370/168's for June/July Special 2 & 3 Year Rates 370/168 Attached Processor Available June 14 Megabytes Memory IBM & OEM Various increments	370/158 Model 3 with ISC Available July Ron Baker	3155-J2 Serial #10206 Dated w/2 Megs CMI Memory Available Now	WANTED! Any 133/148 For Delivery within 90 Days	360/65 1/2 Meg. — 3 Channel High Speed I/O Set Tape & Disk Available Now Lease and/or Purchase Joe Romeo	3277-02 with: 4631 or 4633 Available 30 Days Controllers also Available Kay Richard							
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<p><b>DECSYSTEM 20-LISP</b></p> <p>Position available for a Programmer Analyst in a DECSYSTEM-20 research environment. Will work directly with faculty and other researchers in artificial intelligence. Will be responsible for maintenance and development of research tools and other support of research activities. Should be familiar with LISP or other single manipulation language.</p> <p>Requires Bachelors degree or equivalent related work experience, as well as, a thorough knowledge of timesharing systems.</p> <p>Excellent fringe benefits.</p> <p>Qualified candidates send resumes (Ref. #213) indicating salary requirements to:</p> <p><b>Division of Personnel</b> <b>RUTGERS UNIVERSITY</b> <b>New Brunswick, N.J. 08903</b></p> <p>Affirmative Action/ Equal Opportunity Employer</p>	<p><b>MIS EXECUTIVE IN RETAILING</b></p> <p>New Orleans Chain Store with over 100 stores needs a top-notch MIS Director. This executive position will require effective Management Skills, Management Experience, as well as a strong Data Processing Background. Experience in Merchandise Reporting, POS, and other Retailing Areas are very beneficial.</p> <p>Salary Depending on Experience.</p> <p>Call Mr. Hudson (Toll Free) at 1-800-535-8370, or send resume to P. O. Box 2189, Baton Rouge, Louisiana, 70821.</p>	<p><b>AVAILABLE NOW</b></p> <p><b>DEC PDP 11/60</b> <b>DEC DATASYSTEM D567C-AA</b> 254KB MOS LA38 Console 3' RK06 Drives &amp; Control DH11-AD 16 Line Multiplexor TJE16-AA 800/1400 BPI Tape &amp; Control 300 LPM Printromix Printer DUP11-DA Synchronous Interface KG11-A Communications Arithmetic OPD 2780 Software License CIS-500 Level 3A License RSTS/E, BASIC PLUS 2 + &amp; RMS11 K</p> <p>Approximately One Year Old Currently Under DEC Maintenance Several VMS CRTs Also Available</p> <p><b>Franklin Computer Systems, Inc.</b> 1545 Wilshire Blvd. Ste.204 Los Angeles, CA 90017 (213) 484-8330 Contact: Frank J. O'Kane</p> <p><b>CMI CORPORATION</b> The IBM Specialists Since 1969</p> <p>755 W. Big Beaver Rd., 19th Floor, Troy, Michigan 48064 • (313) 362-1000.</p> <p><b>IN CANADA CALL:</b> <b>Jacques Dagenais • Montreal, Que. • (514) 374-5920</b> <b>Don Dupuis • Windsor, Ont. • (519) 258-8910</b></p>														

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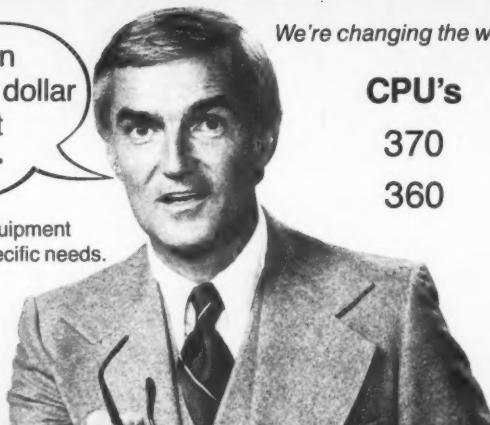
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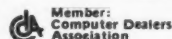
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<p><b>FOR SALE</b></p> <p><b>HONEYWELL COMPUTER SYSTEM</b></p> <table border="1"> <tr> <th>Quantity</th> <th>Type</th> <th>Description</th> </tr> <tr> <td>1</td> <td>2041A</td> <td>CPU 98K M9 Memory</td> </tr> <tr> <td>1</td> <td>222-6</td> <td>Printer 1100 Lpm</td> </tr> <tr> <td>1</td> <td>220-6</td> <td>Console</td> </tr> <tr> <td>1</td> <td>032</td> <td>Print Extension</td> </tr> <tr> <td>1</td> <td>036</td> <td>Print Buffer</td> </tr> <tr> <td>1</td> <td>203B1</td> <td>Tape Control</td> </tr> <tr> <td>1</td> <td>204B-3</td> <td>Tape Drive (Master)</td> </tr> <tr> <td>3</td> <td>204B-3</td> <td>Tape Drives</td> </tr> </table> <p>Equipment maintained by Honeywell FED since installation July 1974. Excellent condition. For availability and price, contact: Lowell Sims, Southeastern Fidelity Insurance Co. P.O. Box 7100/Atlanta, Georgia 30357. Phone (404) 876-7501.</p> <p>Lowell Sims Southeastern Fidelity Insurance Co. P.O. Box 7100/Atlanta, Georgia 30357 Phone (404) 876-7501</p>			Quantity	Type	Description	1	2041A	CPU 98K M9 Memory	1	222-6	Printer 1100 Lpm	1	220-6	Console	1	032	Print Extension	1	036	Print Buffer	1	203B1	Tape Control	1	204B-3	Tape Drive (Master)	3	204B-3	Tape Drives	<p><b>For Sale</b></p> <p><b>PDP-11/03</b></p> <p>System SR — 11300K Includes REV 11-A, DLV11, RXV11, LPV11-PA, Cabinet, RT11 License.</p> <p>Available with/without VT100.</p> <p>RLG Associates, Inc. 11250 Roger Bacon Drive, Reston, Va. 22090 703-471-1106</p>	<p><b>DEC OEMS AND END USERS</b></p> <p><b>FIELD TESTED USER ORIENTED SOFTWARE PACKAGES IN EDUCATION, MEDICINE AND SOCIAL SERVICES</b></p> <p><b>PORE</b> — Problem oriented record entry for doctors and physicians.</p> <p><b>MEDIC</b> — Keeps track of physicians' orders, treatment and examination appointments and drug administration for nursing homes, clinics, hospitals.</p> <p><b>IPP/IEP</b> — Individualized Planned/Educational program system for schools and agencies serving the learning and developmentally disabled.</p> <p><b>TRAK</b> — An early child find, screening, diagnosis and treatment tracking and analysis system.</p> <p>OEM and END USER licenses Available. Full assistance provided with installation.</p> <p>Contact: IPP Systems/Tentime 2006 Broadway Boulder, CO 80302 (303) 449-5674</p>
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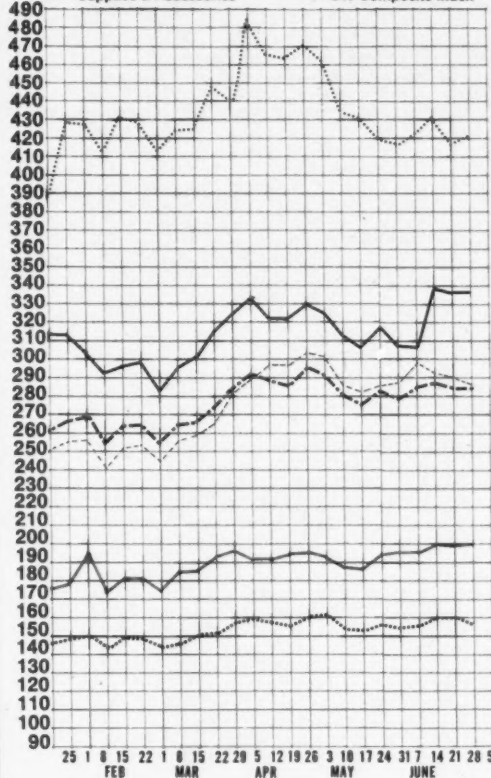
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	1979	a1978
Shr Emtd	\$20	---
Revenue	1,333,947	---
Tax Cred	33,000	---
Earnings	219,437	---

a-Comparable figures unavailable; the company has changed from a fiscal year ending April 30 to one ending March 31.

**SCAN-DATA**  
Three Months Ended March 31

	1979	1978
Shr Emtd	---	\$10
Revenue	\$3,901,777	4,984,264
Tax Cred	---	72,200
Earnings	(198,478)	186,865

**SCIENTIFIC COMPUTERS**  
Nine Months Ended March 31

	1979	1978
Shr Emtd	\$96	\$72
Revenue	7,811,882	6,774,106
Earnings	707,176	523,611

**UDS**  
Thirteen Weeks Ended April 28

	1979	1978
Shr Emtd	\$37	\$37
Revenue	4,545,000	2,544,000
Earnings	360,000	359,000
Revenue Shr	6,577,000	3,548,000
Earnings	195,000	169,000

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## Computerworld Stock Trading Summary

All statistics compiled,  
computed and formatted  
by  
TRADE QUOTES, INC.  
Cambridge, Mass. 02139

TRADE QUOTES

CLOSING PRICES WEDNESDAY, JUNE 27, 1979

	1978-79	CLOSE	WEEK	WEEK
	RANGE	JUN 27	CHNGE	PCT CHNGE
(1)	1979			
<b>COMPUTER SYSTEMS</b>				
A ANDAHV CORP	23- 69	26 1/2	+1 1/2	+6.0
N BURROUGHS CORP	59- 87	78 5/8	+1 1/4	+1.8
O COMPUTER AUTOMATION	13- 44	13 1/2	+ 1/2	+3.8
N CONTROL DATA CORP	23- 44	39 5/8	+ 1/4	+0.6
O CRAY RESEARCH INC	8- 39	36	0	0.0
N DATA GENERAL CORP	42- 74	69	-2 3/4	-3.8
N DATAPoint CORP	34- 82	76 1/4	- 3/4	-0.9
N DIGITAL EQUIPMENT	39- 58	57 1/8	+1 7/8	+3.3
N ELECTRONIC ASSOC.	2- 13	6 3/8	- 1/4	-3.7
A ELECTRONIC ENGINEER.	9- 19	11 3/8	+ 1/8	+1.1
N FOUR-PHASE SYSTEMS	19- 40	36 1/4	+ 1/2	+1.4
N FOXBORO	28- 40	35 5/8	-1 3/8	-3.7
O GENERAL AUTOMATION	7- 26	13 5/8	+ 1/8	+0.9
O GRI COMPUTER CORP	1- 3	1 1/4	0	0.0
N HEWLETT-PACKARD CO	62- 98	96 3/4	+1	+1.0
N HONEYWELL INC	43- 76	69 3/8	+ 1/8	+0.1
N IBM	73-321	73 1/2	+ 1/2	+0.6
O MANAGEMENT ASSIST	9- 29	18 3/4	-1	-5.0
O MANUFACTURING DATA S	9- 26	26 1/4	+2	+8.2
O MICRODATA CORP	18- 29	29 1/4	+1 1/2	+5.4
O MINI-COMPUTER SYST	4- 8	4 3/4	- 1/4	-5.0
O MODULAR COMPUTER SYS	7- 18	13	+ 1/2	+4.0
N NCR	37- 72	66 1/4	-2 3/4	-3.9
N PRIME COMPUTER INC	9- 22	17	- 3/8	-2.1
N PERKIN-ELMER	17- 34	29 3/4	+ 1/2	+1.7
N SPERRY RAND	33- 51	45 5/8	+1 1/4	+2.8
A SYSTEMS ENG. LABS	11- 24	11 1/2	-1 1/2	-4.1
O TANDEN COMPUTERS INC	13- 37	38 1/2	+ 1/2	+1.6
A WANG LABS.	6- 22	20 1/4	- 3/4	-3.5
<b>LEASING COMPANIES</b>				
O BOOTHIE COURIER CORP	13- 21	17	0	0.0
O COMDISCO INC	3- 21	16	0	0.0
A COMMERCE GROUP CORP	1- 1	1/2	0	0.0
A COMPUTER INVESTORS GRP	1- 7	4	+1	+33.3
O CONTINENTAL INFO SYS	5- 15	5 1/2	0	0.0
N DATRONIC RENTAL	1- 4	3 1/4	- 3/8	-10.3
A DCL INC	3- 5	5 1/4	+ 1/4	+5.0
N DRP INC	8- 14	11	- 3/8	-3.2
N ITEL	11- 36	18 1/2	-1 1/2	-12.5
N LEASCO CORP	24- 43	40 7/8	+1 1/4	+3.1
O LEASPCORP	1- 4	1/2	0	0.0
A PIONEER TEX CORP	3- 7	3 1/4	- 1/8	-3.7
N U.S. LEASING	13- 26	16 3/8	0	0.0

	1978-79	CLOSE	WEEK	WEEK
	RANGE	JUN 27	CHNGE	PCT CHNGE
(1)	1979			
<b>SOFTWARE &amp; EDP SERVICES</b>				
O ADVANCED COMP TECH	1- 2	1 1/2	0	0.0
O ANACOMP INC	8- 22	15 1/4	- 1/4	-1.6
A APPLIED DATA RES.	8- 17	10 1/2	+ 3/8	+3.7
N AUTOMATIC DATA PROC	24- 36	32 3/4	- 7/8	-2.6
O COMPU-SERV NETWORK	5- 16	15 1/4	- 3/4	-4.6
O COMPUTER HORIZONS	1- 9	4 1/4	0	0.0
O COMPUTER NETWORK	5- 16	7 7/8	0	0.0
N COMPUTER SCIENCES	8- 17	12 1/8	-1 1/2	-3.9
O COMPUTER TASK GROUP	1- 7	7 1/2	0	0.0
O COMPUTER USARE	2- 4	2 1/8	+ 1/8	+6.2
O COMPUT AUTO REP SVC	4- 18	7 1/4	0	0.0
O COMSHARE	6- 26	22 1/4	-1	-4.3
O CULLINANE CORP	14- 33	28	+ 1/2	+2.5
O DATA DIMENSIONS INC	3- 9	2 1/2	- 3/8	-13.9
O DATATAB	1- 4	2 3/4	0	0.0
N ELECTRONIC DATA SYS.	15- 25	23 3/8	- 3/8	-1.5
O INSYTE CORP	1- 3	1 1/4	0	0.0
O IPS COMPUTER MARKET.	2- 3	3	0	0.0
O KEANE ASSOCIATES	3- 6	4 3/4	0	0.0
O KEYDATA CORP	1- 4	3	- 1/4	-7.5
A LOGICON	13- 19	13 1/2	- 1/4	-1.8
A NATIONAL CSS INC	15- 48	47 3/8	0	0.0
O NATIONAL DATA CORP	7- 13	10 5/8	+ 1/8	+1.1
O ON LINE SYSTEMS INC	12- 30	21 3/8	- 1/8	-0.5
N PLANNING RESEARCH	4- 10	5 3/4	+ 1/8	+2.2
O PROGRAMMING & SYS	1- 1	1 1/4	0	0.0
O RAPIDATA INC	3- 7	5 1/2	+ 1/8	+2.5
O REYNOLDS & REYNOLD	18- 36	28 3/4	+ 1/4	+0.8
O SCIENTIFIC COMPUTERS	3- 9	6 5/8	- 3/8	-5.3
N TMSHARE INC	18- 41	34 1/2	-2 3/8	-6.4
A URS SYSTEMS	5- 8	5 1/2	- 1/8	-2.2
N WLY CORP	1- 7	5 3/4	-1 1/8	-21.1
<b>PERIPHERALS &amp; SUBSYSTEMS</b>				
N ADDRESSOGRAPH-MULT	13- 32	14 1/2	-1 1/4	-7.9
N AMPEX CORP	10- 19	15 5/8	+ 3/8	+2.3
O ANDERSON JACOBSON	5- 10	7 3/4	+ 1/8	+1.6
N APPLIED DIG DATA SYS	8- 22	8 3/4	0	0.0
O BEEHIVE INT'L	3- 7	4 7/8	0	0.0
A BOLT-BERANEK & NEW	6- 14	13 1/2	0	0.0
N BUNKER-RAND	10- 29	23 1/4	-1 3/8	-5.5
A CALCOMP	3- 13	11 1/4	- 1/8	-1.0
O CAMBRIDGE MEMORIES	2- 9	2 1/4	- 3/8	-14.2
N CENTRONICS DATA CORP	16- 48	46 1/8	- 7/8	-1.8
O COBITRONICS	1- 4	2 1/2	- 3/8	-17.6
O COMPUTER COMMUN.	6- 10	8 1/4	0	0.0
O COMPUTER CONSOLES	4- 16	13	+ 1/4	+1.9
A COMPUTER EQUIPMENT	3- 8	4 3/4	0	0.0
O COMPUTER TRANSCIVER	1- 5	2 1/2	- 3/8	-15.0
O COMPUTERIZATION CORP	9- 61	55 3/8	+ 3/8	+0.6
N COMVAC CORP	13- 26	14 5/8	0	0.0

	1978-79	CLOSE	WEEK	WEEK
	RANGE	JUN 27	CHNGE	PCT CHNGE
(1)	1979			
<b>SUPPLIES &amp; ACCESSORIES</b>				
A AMERICAN BUS PRODS	8- 11	9 3/8	0	0.0
O BALTIMORE BUS FORMS	1- 4	1	0	0.0
N BARRY WRIGHT	14- 34	15 1/4	- 7/8	-5.4
O CYBERMATICS INC	1- 1	7/8	0	0.0
O DUPLER PRODUCTS INC	13- 30	23 1/2	+2 3/4	+13.2
N EMMIS BUS. FORMS	5- 15	15 1/8	- 1/8	-0.8
N JN COMPANY	43- 66	56 1/2	- 3/8	-0.6
O MOORE CORP LTD	26- 34	32 1/4	+ 1/4	+0.7
N NASHUA CORP	18- 37	21 1/4	- 7/8	-3.9
O STANDARD REGISTER	20- 27	26	+ 1/4	+0.9
A TAB PRODUCTS CO	8- 14	14 7/8	+ 1/8	+0.8
A WABASH MAGNETICS	18- 22	15 7/8	+ 1/8	+0.7
N WALLACE BUS FORMS	18- 33	25 7/8	+ 1/4	+0.9

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH  
L=LOANATIONAL; H=HAWAII; O=OVER-THE-COUNTER  
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. ON LAST BID  
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